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Econ 200
Fall 2001 Schwab

Problem Set 2 Solutions to Problems 5, 6, 7, 8, 9

5. Suppose the supply of labor is perfectly inelastic. The government imposes a tax on employers to fund health care. (A) What is the statutory incidence of this tax? (B) What is the economic incidence of this tax? (C) How would your answers to (a) and (b) change if the supply of labor were perfectly elastic?

We will assume that demanders of labor have a demand curve that is somewhat elastic but neither perfectly inelastic nor perfectly elastic.

A. The statutory incidence of the tax falls on the employers, who demand labor to staff their factories and offices.

B. The economic incidence of the tax will fall on the suppliers of labor. This is because the economic incidence of a tax is borne by the less elastic party, and in this case suppliers are as inelastic as you can get.

C. Part (A) would not change at all - statutory incidence is hard coded into the law. Part (B) on the other hand would be totally different. Economic incidence would fall on the demanders of labor. This is because the perfectly elastic suppliers would definitely be more elastic than demanders (who we assumed did not have a perfectly elastic demand curve).

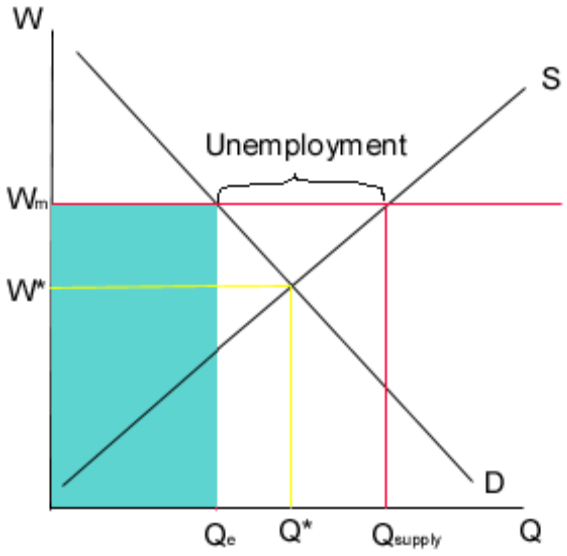
6. Do problem 8 on page 137 in Mankiw: A case study in this chapter discusses the federal minimum wage law.

A. Suppose the minimum wage is above the equilibrium wage in the market for unskilled labor. Using a supply and demand diagram of the market for unskilled labor, show the market wage, the number of workers who are employed, and the number of workers who are unemployed. Also show the total wage payments to unskilled workers.

B. Now suppose the secretary of labor proposes an increase in the minimum wage. What effect would the increase have on unemployment? Does the change in employment depend on the elasticity of demand, the elasticity of supply, both elasticities, or neither?

C. What effect would this increase in minimum wage have on unemployment? Does the change in unemployment depend on the elasticity of demand, the elasticity of supply, both elasticities, or neither?

D. If the demand for unskilled labor were inelastic, would the proposed increase in the minimum wage raise or lower total wage payments to unskilled workers? Would your answer change if the demand for unskilled labor were elastic?



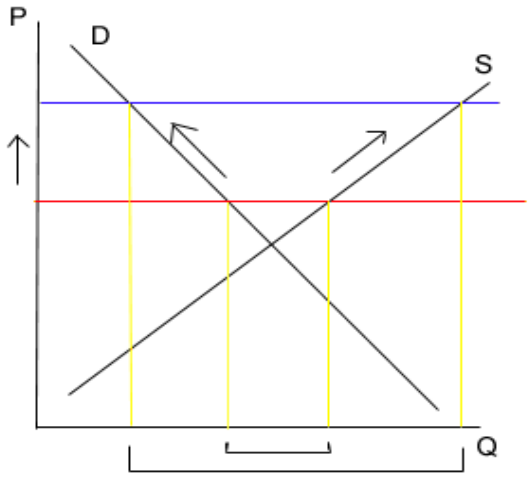
Here W_m is the minimum wage, Q_e is the amount of workers the labor demanders actually hire, and Q_{supply} are the amount of workers who would be willing to work at the minimum wage.

The difference between Q_e and Q_{supply} is the amount of unemployment (people who want to work but are not hired).

Q_e workers are each being paid $W_{m,}$ so the total wage payments to unskilled workers equals the blue-green rectangle whose area is Q_e multiplied by W_m.

What's really going on here? This is a simple market, really. Throw away all the fancy names like labor, employment, wage, etc. and you really have our generic supply and demand diagram. What is wage? Price of the thing called labor. What is employment? Quantity of the thing called labor being demanded. What is unemployment? It is the difference between the Quantity of the thing called labor being supplied and the Quantity of the thing called labor being demanded: this is really just excess supply.

We could actually do this whole problem like we would do a generic price floor policy by government. What happens when there's a price floor above the equilibrium price? There is excess supply because at the high price demanders don't want as much while suppliers want to sell more. The further we get away from equilibrium, the bigger this wedge gets, right?



Take a look at this generic diagram. We set a minimum price at the red line. Note that at the red price, there is excess supply.

Now suppose we change the price and set a new minimum price at the blue line. What did we change? We changed the price of the good. A change in the price of a good will change the quantity supplied and the quantity demanded. Remember, these are movements along the two curves - neither curve shifts.

As we get further away from equilibrium, excess supply gets way bigger.

Now what if you relabeled all of these things as P=Wage, Q=Labor, S=Workers, D=Firms, Quantity Demanded = Employment, and Excess Supply = Unemployment? That is exactly what is going on in our minimum wage example.

Does a change in Quantity Demanded depend on the elasticity of the supply curve? No.
Does a change in Quantity Demanded depend on the elasticity of the demand curve? Yes.

Therefore, a change in Employment (demand for labor) depends on the elasticity of the demand curve.

Does a change in Excess Supply depend on change in Quantity Demanded? Yes.
Does a change in Excess Supply depend on change in Quantity Supplied? Yes.
Does a change in Quantity Supplied depend on the elasticity of the supply curve? Yes.

Therefore, a change in Unemployment (excess demand for labor) depends on the elasticity of both the supply and demand curves.

Lastly, we are asked what happens to total wage payments if the demand curve is elastic or inelastic. What are total wage payments? This is a fancy name for expenditures by demanders of the thing called labor: price times quantity demanded.

If demand is inelastic, then the percentage increase in price is bigger than the percentage decrease in quantity demanded. So expenditures increase. *Therefore, total wage payments would increase if demand was inelastic.*

If demand is elastic, then the percentage increase in price is smaller than the percentage decrease in quantity demanded. So expenditures decrease. *Therefore, total wage payments would decrease if demand was elastic.*

7. Do Problem 7 on page 159 in Mankiw.

There are four consumers willing to pay the following amounts for haircuts: Jerry $7, Oprah $2, Sally Jessy $8, and Montel $5. There are four haircutting businesses with the following costs: A $3, B $6, C $4, and D $2.

Each firm has the capacity to produce only one haircut. For efficiency, how many haircuts should be given? Which businesses should cut hair, and which consumers should have their hair cut? How large is the maximum total surplus?

The first thing to do is order the suppliers and demanders in order of willingness to pay and cost of production:

Consumer	WTP
Sally Jessy	8
Jerry	7
Montel	5
Oprah	2

Firm	Cost
D	2
A	3
C	4
B	6

Why do we order them this way? The goal is to maximize total surplus. The surplus value of something is the difference between the willingness to pay of the person that consumed it and the cost incurred by the person that produced it. So high willingness to pay is good and low cost is good when trying to maximize surplus.

If any haircuts are consumed, who do we want to give it to? Obviously, we want to give it to the people that value it the most - the person with the highest willingness to pay. We give the first good to whoever values it most and then go down the line.

If any haircuts are produced, who do we want to produce them? Obviously, we want the lowest cost producer to produce them. We have the lowest cost guy produce first and then go down the line.

Suppose 1 haircut was made. We'd give it to the highest willingness to pay consumer (Sally Jessy) and have the lowest cost producer (D) make it. The total surplus would be Total WTP minus Total Cost: 8 - 2 = 6.

Suppose 2 haircuts were made. We'd give them to the two highest willingness to pay consumers (Sally Jessy and Jerry) and have the two lowest cost producers (D and A) make them. The total surplus would be Total WTP minus Total Cost: (8 + 7) - (2 + 3) = 15 - 5 = 10.

For 3 haircuts, the total surplus is 20 - 9 = 11. For 4 haircuts, the total surplus is 22 - 15 = 7. We can easily see that 3 haircuts maximizes total surplus. Who gets these three haircuts? Sally Jessy, Jerry, and Montel. Who gives these three haircuts? Firms D, A, and C.

8. Do Problem 9 on page 160 in Mankiw.

Consider how health insurance affects the quantity of health care services performed. Suppose the typical medical procedure has a cost of $100, yet a person with health insurance pays on $20 out-of-pocket when she chooses to have an additional procedure performed. Her insurance company pays the remaining $80. (The insurance company will recoup $80 through higher premiums for everybody, but the share paid by this individual is small.)

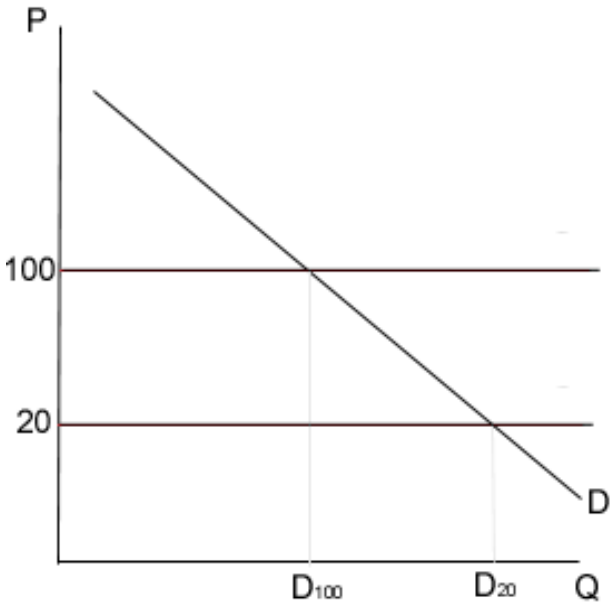
A. Draw the demand curve in the market for medical care. (In your diagram, the horizontal axis should represent the number of medical procedures demanded if each procedure has a price of $100.

B. On your diagram, show the quantity of procedures demanded if customers pay only $20 per procedure. If the cost of each procedure to society is truly $100, and if individuals have health insurance as just described, will the number of procedures performed maximize total surplus? Explain.

C. Economists often blame the health insurance system for excessive use of medical care. Given your analysis, why might the use of care be viewed as "excessive"?

D. What sort of policies might prevent this excessive use?

This is a very badly written question, in my opinion. Mankiw doesn't tell you what willingness to pay looks like, so just draw an arbitrary demand curve. Consider the following diagram:

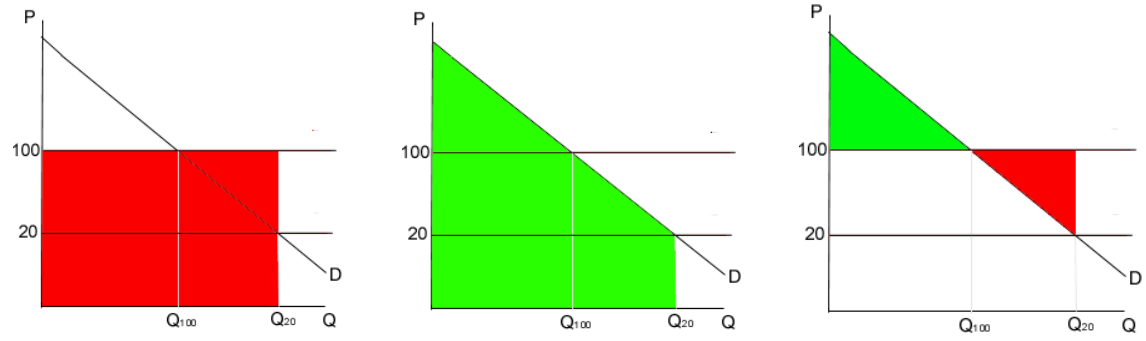


I just drew any old ordinary looking demand curve here. Q_{100} is demanded when P = 100. Also, Q_{20} is demanded when P = 20.

The question asks us to determine if the quantity demanded at P = 20 will maximize total surplus. The answer is no - see below for why this is so.

Let's start with the case where this insurance exists.

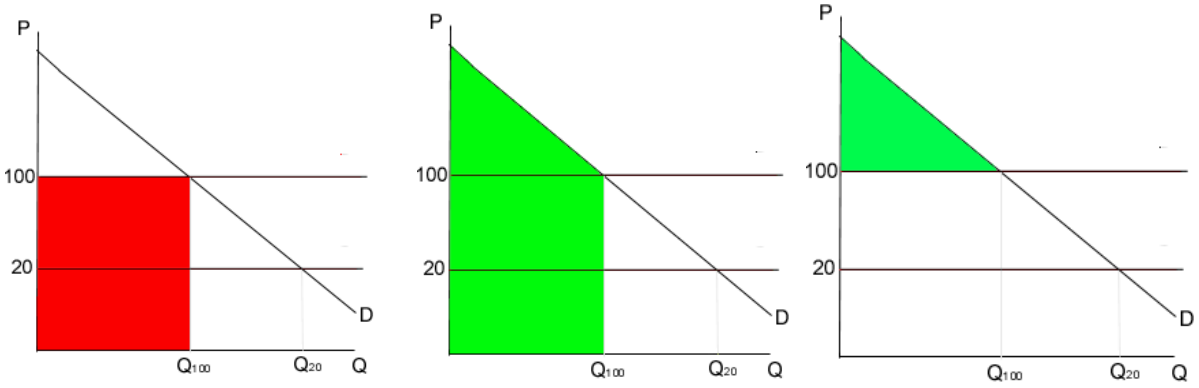
At P = 20, consumers have Q_{20} procedures performed. What is the total cost to society to get these procedures performed? Q_{20} times 20, the area of that red rectangle. What's the benefit to these consumers of the Q_{20} procedures? It's everything under the demand curve - that green area.



What is the total effect on society? Anything both green and red means that cost and benefit cancel each other out. We do have a triangle of benefit and a triangle of cost that do not overlap though: that's shown in the third diagram on the far right. This is the case when the insurance exists.

Now let's consider a world where insurance does not exist. Demanders must now pay the full price of $100 if they want to get a procedure done.

At P = 100, consumers have Q_{100} procedures performed. What is the total cost to society to get these prcedures performed? Q_{100} times 100, the area of that red rectangle. What's the benefit to these consumers of the Q_{100} procedures? It's everything under the demand curve - that green area.



When we figure total surplus by canceling out the overlapping red and green areas, we get the thing on the far right. This is the same leftover green triangle from the insurance case - except now we don't have the leftover red triangle of costs!

Obviously, if we have the same amount of benefit and less costs than in the insurance case (in fact, the leftover costs are zero), then surely this no insurance case is better than the case where insurance existed. Since we have found at least one situation that produces higher total social surplus than the insurance case, we can be certain that the insurance case does not maximize social surplus.

Notice that when insurance was made available, people had many more procedures done than they would have if they had to pay the full cost of the procedure. So many more, in fact, that when you weigh cost and benefit, society ends up losing out. What happened?

Remember what the demand curve represents - it is the marginal willingness to pay. For some reason, only Q_{100} people thought it was worth their while to get a procedure done at that price. You can be sure that there are people thinking "Well, if it was 80 dollars, I'd have a procedure, but it isn't worth that much to me. I will pass." What happens when the insurance makes the price of the procedure go down to 20? That guy (and a whole bunch of guys all the way down to 20 dollar willingness to pay guys) will suddenly say "Wow, that procedure is now worth more to me than I would have to pay. I will get the procedure done." So more procedures get performed.

But wait, it still costs society 100 to provide every single procedure. But we now have guys who only value it at 80, or 60, or even 20 getting procedures. When our 80 dollar guy gets his procedure, social surplus increases by his low marginal value (+80) and decreases by the high cost of performing the procedure (-100). What's the net change? Society ended up losing 20 surplus because this low valuation guy got a procedure done! Each of these new low valuation guys that get a procedure done when insurance lowers the price is causing a loss to society. In the sense that these procedures are not "worth" performing, they can be considered "excessive."

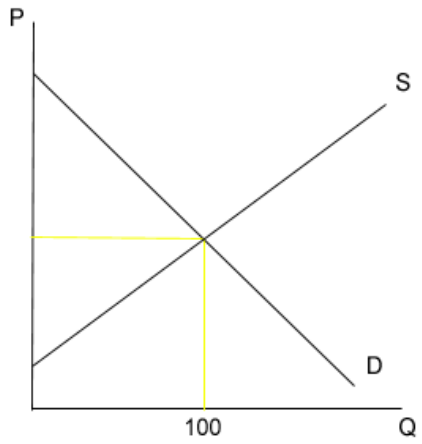
What kinds of policies would prevent this kind of excessive use? Health care companies often make a list of procedures that they will and will not cover. Chances are that if someone needs a heart transplant to save his life, he values that operation a LOT. But someone who wants a tummy tuck to look good at the beach probably doesn't really care all that much and can live without it. When an HMO refuses to cover frivolous procedures like tummy tucks, they are probably preventing negative social surplus procedures from being performed.

9. Suppose the equilibrium number of taxis in Washington DC is 100. The DC government is considering a new policy that would set the maximum number of taxis at 75.

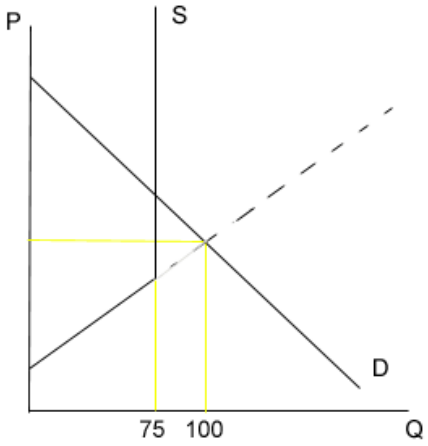
(A) What would happen to consumer surplus under this policy?
(B) What would happen to producer surplus?
(C) What would happen to the sum of consumer surplus and producer surplus?

First thing is to diagram the market and figure out what's going on. We want to know what happens to equilibrium price and quantity after the policy is enacted.

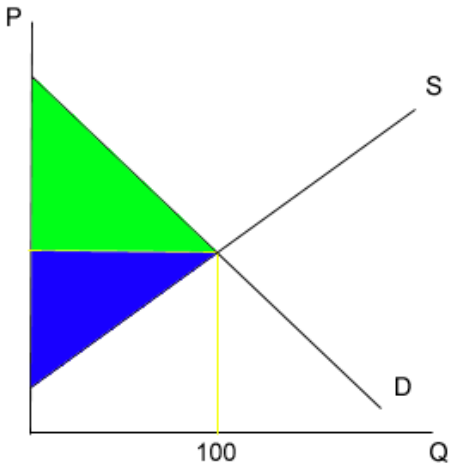
Here's the market before the policy:

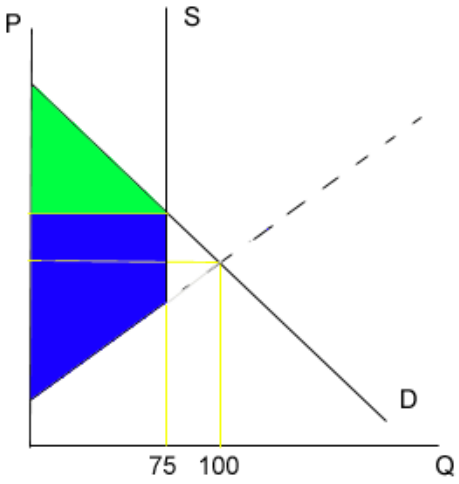


Here it is after the policy is enacted:



This should look familiar; it is the exact same thing that happened with the Japanese Auto import restriction in Problem Set 1. Now the question is where producer and consumer surplus is:





The green areas are consumer surplus and the blue areas are producer surplus. Notice that after the policy is enacted, there's a small white triangle near the old pre-policy equilibrium. This is the deadweight loss you will see in Chapter 8. For this problem, it is sufficient to note that the total surplus of the society (consumer plus producer surplus) shrank because this little white triangle is now surplus to nobody. Also, notice that both consumers and producers lost in that little white triangle, but another change occurred as well - part of the consumer surplus became producer surplus.