

Example 3.J: Excess burden *formula under linear model* & *Tax-Revenue-maximizing tax rate*

$$\text{Demand: } p^d = a - bQ^d \quad ; \quad a \geq 0, \quad b \leq 0.$$

$$\text{Supply : } p^s = c + dQ^s \quad ; \quad d \geq 0.$$

- Solve for quantity and prices equilibrium when the unit tax is imposed. Analyze the result

$$Q^d = \frac{a - p^d}{b}$$

$$Q^s = \frac{p^s - c - t}{d}$$

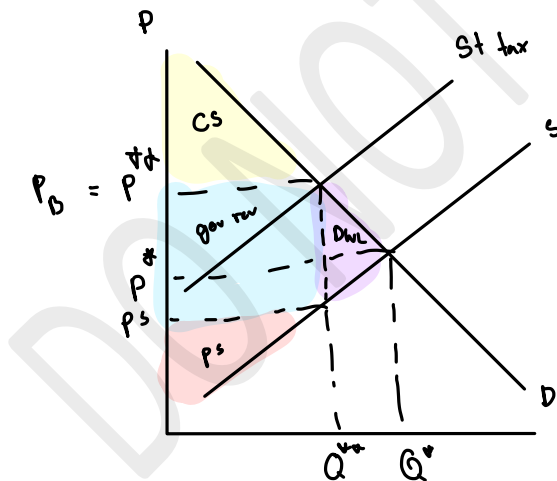
$$\text{eqbm : } p^s = p^d$$

$$c + dQ^s + t = a - bQ^d$$

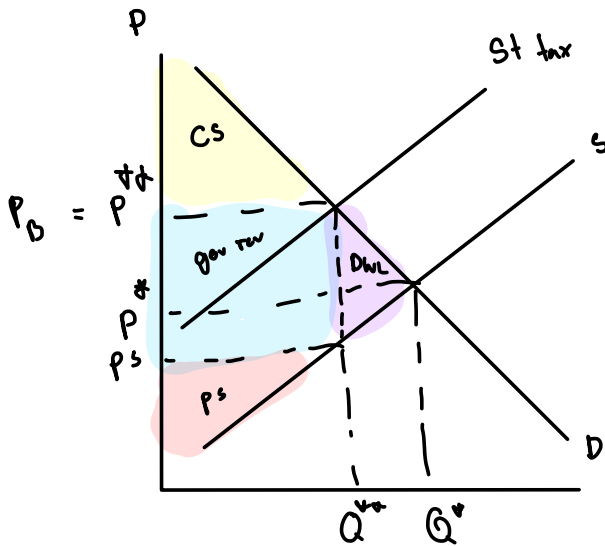
$$Q^s (d + b) = a - c - t$$

$$Q^{**} = \frac{a - c - t}{d + b}$$

$$P = c + t + d \left[\frac{a - c - t}{d + b} \right]$$



- Derive the excess burden formula for buyers and sellers



Before tax: Consumers buy at P^* , Seller sell at high price (P^*)
but consumer can buy at cheap.

After tax: Consumers buy at higher price at P_B , and producer
which receive less at P_s .

Extra price that consumers pay at $=(P_B - P^*) Q^{**}$

Extra price that producers pay at $=(P_s - P^*) Q^{**}$

- Calculate the tax rate that maximizes the tax revenue of government.

$$\begin{aligned} \frac{\partial \text{tax-rev}}{\partial \tau} &= \left[\frac{a-c-t}{d-b} \right]_{\tau} t \\ &= at - ct - t^2 + d^{-1} t + b^{-1} t \\ 0 &= a - c - 2t - d^{-1} - b^{-1} \\ 2t &= a - c - d^{-1} - b^{-1} \\ t &= \frac{a - c - d^{-1} - b^{-1}}{2} \end{aligned}$$

Example 3.K Price control and Welfare

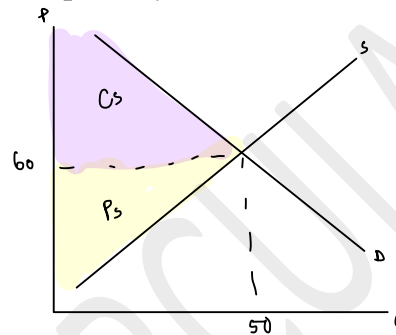
Consider the market for apartment rentals in Chicago. The price of rent is determined by the following system of equations.

$$\text{Demand: } p = -2q_d + 160$$

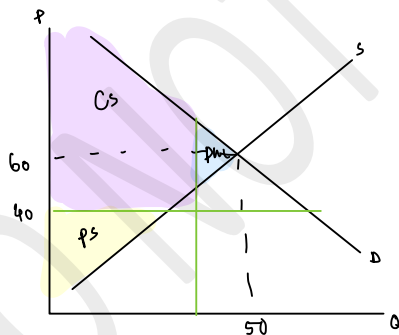
$$\text{Supply: } p = q_s + 10$$

- What is the equilibrium price and quantity in the market for apartment rentals?

$$\begin{aligned} \text{Eqbm : } p^s &= p^d \\ Q^s + 10 &= -2Q^d + 160 \\ 3Q &= 150 \\ Q &= 50 \\ P &= 60 \end{aligned}$$



- Suppose the government tries to control the rent prices through a price ceiling of \$40. Discuss the implication of this policy. Is there any deadweight loss?



When the policy announce to make the quality reduce, by have a lower price for affordable price (40) to increase the demand of people to buy the apartment. On the other hand, it make a DWL the owner didn't want it to happen.