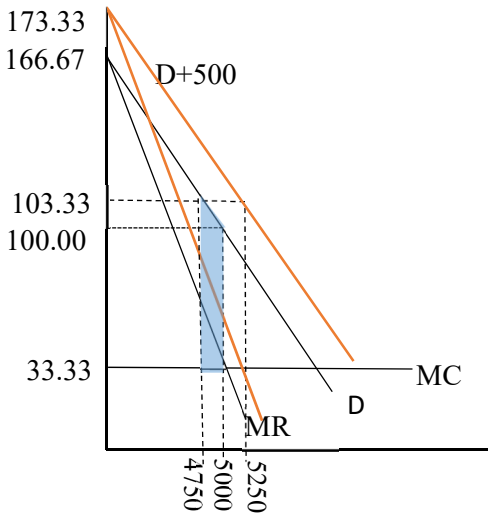
Opportunity Cost of Inputs 4

A project requires signing buying 500 cubic yards of concrete per week for the next year from the only local provider. The currently price is $100 per yard and the provider sells 5,000 yards per week. Assuming marginal cost is constant, elasticity of demand at the current price is -1.5, and using a linear demand approximation, estimate the opportunity cost of the weekly government purchase. The METB is 0.2. Note you will need to find the original demand, the new demand, the new price, and the new quantity purchased by those other than the government in the process.

Answer



First, guess MC using p and elasticity:

$p=MC(\eta/(1+\eta))$

$100=MC(-1.5/(1-1.5))$

$MC=33.33$

Second, find initial demand:

$-1.5 = [(q-q_0)/(p-p_0)](p_0/q_0)$

$-1.5 = [(q-5000)]/(p-100)](100/5000)$

Solving gives $q=12500-75p$

Let us also find marginal revenue…

Rearranging gives $p=166.67-(1/75)q$

Marginal Revenue is then $MR=166.67-(2/75)q$

Third, find new demand by adding 500 (government purchases) to old demand: $q=13000-75p$

Fourth, find the new marginal revenue.

What is the new choke point? $0=13000-75A$, $A=173.33$. So $MR=173.33-(2/75)q$

Fifth, find the new quantity: $MR=MC$, $173.33-(2/75)q=33.33$, $q=5250$. Private quantity is 4750.

Sixth, find the new price: $5250=13000-75p$, $p=103.33$

Seventh, calculate the surplus changes

$\Delta CS=-3.33\times4750-3.33\times250/2=-16234$

$\Delta PS=70\times5250-66.67\times5000=34150$

$\Delta GS=-103.33\times500=-51665$

$\Delta SS=-16233.8+34150-1.2\times51665=-44082$