

31E99906 Capstone Microeconomic Policy

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Return method: through mycourses by the deadline

Problem Set 2: Question 3

Consider the highway between Aalto university and Helsinki. Denote the volume cars on this road by Q (e.g., cars/lane/km). The travel time per traveller from Aalto to Helsinki depends on the volume: $T(Q)$ (say, in minutes). Assume in particular that $T(Q) = 5 > 0$ (constant) for low volume $Q < 10$ and $T(Q) = 5 + (Q - 10)$ for larger Q . The value of time for an average traveller is estimated to be 1EUR per unit of time, so the total time cost in money is $TC(Q) = QT(Q)$ (for all drivers). The willingness to pay for one highway trip is so that for car volume Q the lowest valuation driver on the road is willing to pay $D(Q) = 55 - 2Q$. (The numbers are not realistic but chosen to help analysis).

1. How many drivers will enter the highway if volume is not regulated? That is, using the above information, identify the determinants of the volume.
2. Identify the externality in the situation. How many drivers should be allowed to enter the highway? That is, what is the socially optimal Q ?
3. How could a price instrument be used for correcting the externality?
4. How could a quantity instrument be used for correcting the externality?
5. Assume then that the demand can be low $D(Q) = 45 - 2Q$ or high $D(Q) = 65 - 2Q$, but this is not known at the time of designing the regulations. Should one use the price or quantity instrument? There is an instrument that gives the first-best outcome – can you discuss this option?