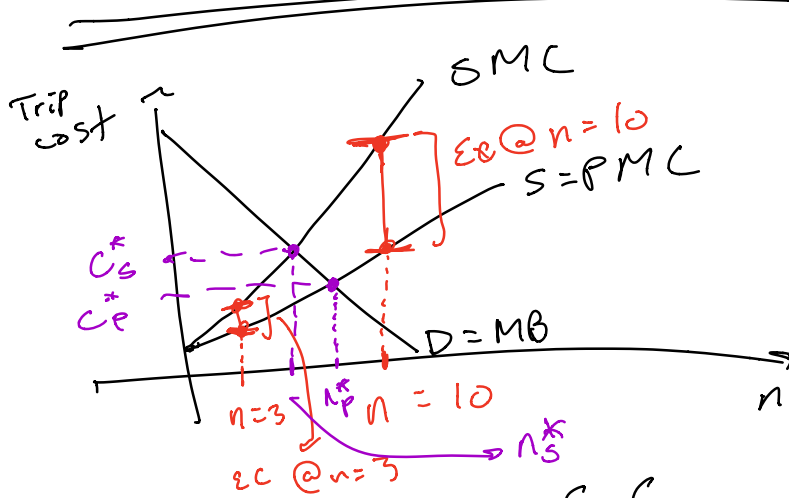


# Congestion Externalities



$n \equiv$  number of vehicles on Road

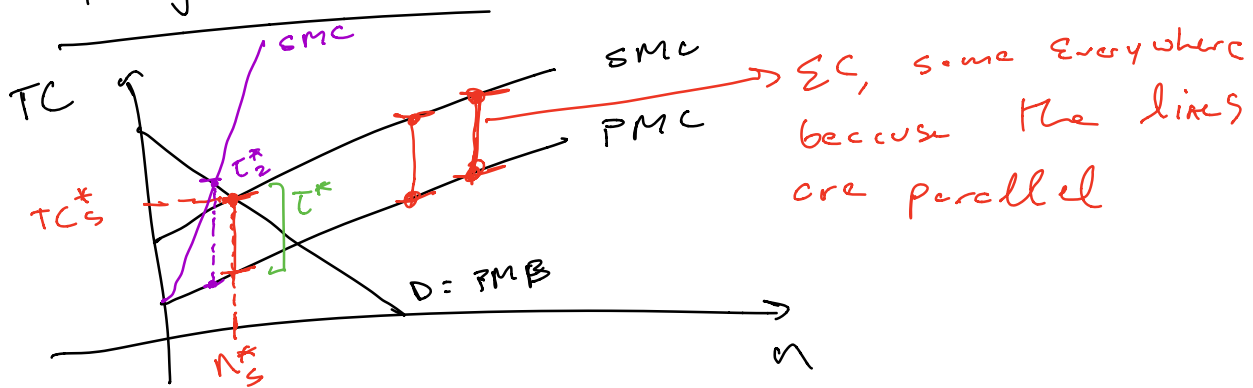
$$SMC = PMC + \frac{\Sigma C}{\text{external cost}}$$

$(n_p^*, c_p^*)$ : Private eq/outcome

$(n_s^*, c_s^*)$ : socially optimal eq/outcome

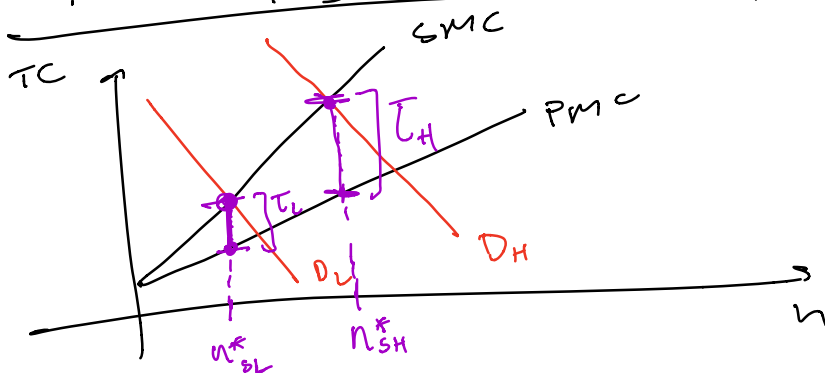
Key takeaway: With negative externalities  
Social optimum is always lower than  
Private optimum.

# Pigou



Pigou says: optimal tax is set to the External cost @ the Socially optimal Q.

## Time varying Demand



$D_L$ : off hrs  
 $D_H$ : Rush hr

$\tau$ : "tax"

$\tau_L < \tau_H \Rightarrow$  need dynamic congestion pricing. Higher demand calls for a higher tax!

