

Principles of Economics and Management I

Ciências ULisboa · MMAEG · 2026/2027

Problem Set 5 · Market Equilibrium and Taxes

Session 5 · LN05

Exercise level: [Easy] routine / warm-up [Medium] typical test level [Hard] challenge (above test level, to consolidate mastery)

1. (2 points) **[Easy] Equilibrium and disequilibrium.** In a market, $Q^d = 100 - 2P$ and $Q^s = 20 + 2P$.
 - (a) (1 point) Find the equilibrium price and quantity.
 - (b) (1 point) At a price of €15, is there excess supply or excess demand? Of how much? How does the market react?
2. (2 points) **[Easy] Shifting the curve or moving along it.** In the previous market ($Q^d = 100 - 2P$, $Q^s = 20 + 2P$), a good harvest raises the quantity supplied by 40 units at every price.
 - (a) (1 point) Write the new supply function and find the new equilibrium.
 - (b) (1 point) Which curve shifted, and in which direction? Did demand shift?
 - (c) (1 point) Compute the change in consumer surplus.
3. (3 points) **[Medium] Tax incidence.** In a market, $Q^d = 120 - 2P$ and $Q^s = -30 + 3P$. A tax of €5 per unit is introduced, legally levied on sellers.
 - (a) (1 point) Find the initial equilibrium.
 - (b) (1 point) Compute the price paid by buyers and the price received by sellers after the tax.
 - (c) (1 point) Split the tax burden and check it against the incidence rule.
4. (3 points) **[Medium] The market for loanable funds.** Credit demand is $D(r) = 800 - 4000r$ and the supply of funds is $S(r) = 200 + 6000r$, with r in decimal form.
 - (a) (1 point) Compute the equilibrium interest rate r^* and the volume of credit V^* .
 - (b) (1 point) A confidence crisis leads households to require 2 percentage points more for the same volume: $S'(r) = 200 + 6000(r - 0.02)$. Recompute.
 - (c) (1 point) Interpret the result.
5. (5 points) **[Hard] Deadweight loss of a tax.** Return to the €5 tax of exercise 4, in the market $Q^d = 120 - 2P$, $Q^s = -30 + 3P$.
 - (a) (2 points) Compute the tax revenue and the deadweight loss.
 - (b) (2 points) Repeat for a tax of €10 and show that the loss grows with the square of the tax.
 - (c) (1 point) What is the implication for the design of tax policy?
6. (5 points) **[Hard] Comparative statics with constant elasticities.** Consider $Q^d(P) = AP^{-\varepsilon}$ and $Q^s(P) = BP^\eta$, with $A, B, \varepsilon, \eta > 0$.
 - (a) (2 points) Obtain the expressions for P^* and Q^* .
 - (b) (2 points) Demand receives a positive shock, $A' = A(1 + t)$. Compute the exact percentage change in P^* and in Q^* .
 - (c) (1 point) Analyze the case where supply is perfectly inelastic ($\eta \rightarrow 0$).