

***UNIVERSITY OF OSLO***  
***DEPARTMENT OF ECONOMICS***

Exam: **ECON4620 – Public Economics I**

Date of exam: Monday, June 6, 2016

**Grades are given: June 22, 2016**

Time for exam: 09.00 a.m. – 12.00 noon

The problem set covers 3 pages (incl. cover sheet)

Resources allowed:

- No written or printed resources – or calculator - is allowed (except if you have been granted use of a dictionary from the Faculty of Social Sciences)

The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

### Problem 1: On tax incidence (1/3)

1. Norwegian wealth owners can either invest their money in real production capital at home, or in financial assets abroad. Production at home is given by the constant returns to scale production function  $F(k, l)$ , where  $k$  is real capital and  $l$  labour. Both capital and labour markets are competitive. Initially there are no capital income taxes and Norwegian capitalists invest both at home and abroad. It is not possible to tax the returns to financial investments abroad. Suppose the government imposes a tax with a rate  $t > 0$  on domestic capital income. Discuss the incidence of this tax, in the short term and in the long term, respectively.
2. Suppose demand for good  $X$  is given by  $Q^D = 900 - p/2$  where  $p$  is the price and  $Q^D$  the quantity demanded. Supply is given by  $Q^S = p/4$ .
  - (a) What is the market equilibrium for good  $X$
  - (b) Suppose a  $\tau = 60$  NOK tax is imposed on each unit of  $X$  that is purchased. What are the equilibrium price and quantity of  $X$  after the tax is imposed.
  - (c) Compute and graphically depict the deadweight loss due to the tax in market  $X$ .
  - (d) What is the incidence of the tax? Explain the intuition for the key factors that determine the incidence.
  - (e) Now suppose that consumers are inattentive to the tax and demand is given by  $Q^D = 900 - (P + \theta\tau)/2$  where  $\theta = 2/3$ . Again, suppose that a tax of  $\tau = 60$  NOK is imposed on each unit of  $X$  that is purchased. How can we interpret  $\theta$ ?
  - (f) Find the new equilibrium price and quantity.
  - (g) Suppose the government sets the tax on  $X$  based on a trade-off between efficiency and distributional concerns. The optimal tax of 60 NOK per unit was based on the assumption that  $\theta$  were equal to 1. Now the government realizes that  $\theta = 2/3$ . Should they then reduce or increase the tax on  $X$  (explain!).

### Problem 2: ACE and CBIT (1/3)

Explain the two tax systems for corporate income taxes known under the respective acronyms ACE and CBIT. Explain why it is reasonable to assume that ACE will have a higher tax rate than CBIT. Explain how these two systems have one common feature, which may be seen as a type of neutrality, and explain why this may be seen as beneficial. Explain how the systems differ, and give some economic argument(s) in favour of either system.

### Problem 3: Short questions (1/3)

1. Consider an income tax system with four tax brackets. Income below 50 000 is exempted from taxation. Income above 50 000 but below 250 000 is taxed at a rate of 20%. Income from 250 to 500 000 is taxed at a rate of 35%. Income above 500 000 is taxed at a rate of 40%. A person with no income gets 100 000 NOK in social benefits. Consider a person who is currently without work but who can get a job that pays 350 000. What is the marginal tax rate if he starts to work, and what is the participation tax rate?
2. Define the elasticity of taxable income, the so-called ETI.
3. One of the cases studied in Sandmo (1974) has interest cost deductible for the full amount of capital invested, ( $k = 0$  in the notation used by Sandmo). In Sandmo's notation,  $s$  is the tax rate,  $K_{1t}$  is the amount of capital of type 1 at time  $t$ ,  $q_1$  is the price per unit of this capital,  $i$  is the interest rate,  $\delta_1$  the rate at which  $K_{1t}$  depreciates, and  $\alpha_1$  is the rate of depreciation allowance for capital of type 1. One of the first-order conditions is

$$p \frac{\partial F}{\partial K_{1t}} - \left[ i + \delta_1 + \frac{s}{1-s} (\delta_1 - \alpha_1) \right] q_1 = 0$$

Explain what type of tax distortion is evident in this equation, and what is the effect on the firm's optimal choice?

4. Explain why it is seen as necessary, in some tax systems, to split the income from closely held firms into labour income and capital income. How can this be done, and what may be problematic about the method?
5. Discuss the statement: A tax on labour income that does not change the labour supply will not have a dead weight loss associated with it!
6. Discuss the statement: The excess burden of a tax is proportional to the tax rate!