UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Exam: **ECON4622 – Public Economics II**

Date of exam: Wednesday, December 6, 2017   **Grades are given:** January 4, 2018

Time for exam: 14.30 – 17.30

The problem set covers 4 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.

Final Exam, December 6, 2017
ECON 4622, Public Economics II
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1 Ricardian Equivalence (15 points)

You are advisor to the Swedish king in 1618, right at the onset of the 30-year war in Europe between protestant forces, led by Sweden, and catholic forces, led by the German emperor. The cost, per capita, of the war for the next thirty years, is $10,000$ kroner. The king has come up with three policies to finance the war:

  a Finance the war with immediate taxes of $10,000$ kroner.

  b Issue government debt, and repay that debt, including interest, in the 30 year period after the war (1648-1678).

  c Issue government debt and simply pay the interest on that government debt forever, without ever redeeming the debt itself.

Assume that the interest rate for a 30 year period is $r = 100\%$ (so that $1 + r = 2$). Now consider Snorre Viking, a Swedish fisherman that lives from 1618 to 1678, that is, for 2 periods lasting 30 years each. By selling his fish he earns $15,000$ kroner in the first period of his life and $30,000$ kroner in the second period of his life (he gets better catching fish with experience). Snorre has utility function

$$\log(c_1) + \log(c_2)$$

1. Assume that Snorre can borrow and lend freely. How does Snorre rank policies a., b. and c., that is, which one does he like best and which one is worst for him? Explain.

2. Now suppose that Snorre cannot borrow any longer. How does Snorre rank policies a., b. and c., that is, which one does he like best and which one is worst for him? Explain.

3. Finally, suppose that Snorre eats so much healthy fish that he lives forever and that he can borrow. All other things remain the same. How does Snorre rank policies a., b. and c., that is, which one does he like best and which one is worst for him? Explain.

2 Progressive Taxation (15 Points)

The government of Flatonia has implemented a tax code defined by

$$T(0) = b$$

and the marginal tax schedule of

$$T'(y) = \tau$$

for all income levels $y \geq 0$. Here b and τ are parameters (numbers) that can be **positive or negative**.

1. State a condition on the parameters (b, τ) such that the tax code is progressive for all income levels $y \geq 0$.

2. Suppose Flatonia is inhabited by two types of families, those with income of $y = 50,000$ and those with incomes of $y = 150,000$. There is an equal number of both types of families. All households have the same utility function defined over after tax income, and we assume that this utility function is strictly increasing. Also suppose the government of Flatonia has a Rawlsian social welfare function, $W(u(c_1), \ldots, u(c_N)) = \min_i\{u(c_1), \ldots, u(c_N)\}$. What is the optimal tax code that the government of Flatonia should implement, that is, what are the values of (b, τ) the government should choose to maximize Rawlsian social welfare.

3 Taxation and Labor Supply (20 Points)

Consider a household that chooses consumption c and labor supply l to solve the following maximization problem

$$\max_{c,l\geq 0}\left\{\log(c) - \frac{(l)^2}{2}\right\}$$

$$s.t.$$

$$c = (1-\tau)l + Tr$$

where τ is the labor income tax rate, Tr is a transfer by the government. Note that I set the wage per hour work to one to simplify your life.

1. Derive the intratemporal optimality condition, relating labor supply and consumption.

2. Suppose $Tr = 0$. Solve for optimal labor supply.

3. Use your answer in 1. to compare optimal labor supply in two scenarios

   (a) The tax revenues are thrown into the ocean and do not benefit the household at all, that is $Tr = 0$

   (b) The tax revenues are rebated back to the household, which yields $Tr > 0$.

   Under which scenario is labor supply higher, and why? You have to justify your answer even if you do not provide formal calculations.

4 Tax evasion (25 Points)

A tax-payer has income w, not observable to the government. The tax-payer reports income $w - e$ to the government; evasion $e \geq 0$. The reported income is taxed at a rate $t > 0$. The tax payer thinks there is a probability $p > 0$ that the evaded amount is detected. In that case the penalty rate on the evaded amount is $\nu > t$. The tax-payer obtains utility from income, represented by a concave utility-function $u()$. The tax-payer chooses evasion to maximize expected utility.

1. Suppose the tax-payer decides to evade income, write down the first order condition for maximal expected utility.

2. How will a change in the tax-rate t affect evasion? Explain!

3. Show that the condition for having an interior solution is $t > p\nu$.

4. It has been claimed that this condition $(t > p\nu)$ show the inadequacy of the tax-evasion model outlined above (the Allingham & Sandmo model), since it predicts far more evasion than we observe in real life. Discuss this critisism.

5 Mobile capital, taxation and the provision of public goods (25 Points)

Consider a model with N equally sized countries endowed with the same number of perfectly mobile capital units, owned by the private sector. The global capital stock is exogenously given by K, and each country owns $\frac{K}{N}$ units of capital. The capital that is used in production in each country is transformed into output according to the production function $y_i = f(k_i)$ with $f' > 0, f'' < 0$. Suppose the government in country i finances a public good by taxing each unit of capital used in production in country i; $g_i = t_i k_i$. The representative household in i derives utility from consuming a private (composite) and public good, utility is represented by a quasi concave function $u(c_i, g_i)$

1. Show (explain, argue) that if governments choose their tax policy in an uncoordinated way there will be under-supply of public goods.

2. Will this under-supply problem be larger the more countries there are (the higher N is)? Explain.

3. Explain briefly how a more asymmetric world (countries of different size, foreign ownership) can temper, even turn around, this under-supply problem.