

1. **True/False statement (40%)**. Determine whether each statement is true, false, or uncertain and explain why. Answers with no explanation will receive no points.
- (a) If an excise tax of 5 NOK per liter soda is paid by the producers, the price that consumers pay will not change, but the producers will get a 5 NOK lower price per liter soda they sell. [Draw a graph that is consistent with your answer] . **False, the incidence of the tax depends on the elasticity of demand and supply, not on the statutory distribution of the tax. Should draw a market cross**
  - (b) If an income tax does not change the labour supply there is no excess burden associated with that tax. **False, the overall response contains both an income and substitution effect and it is only the substitution effect that matters for the excess burden.**
  - (c) In a small open economy with *perfect* international mobility of capital (international rate of return is equal to  $r$ ), taxing corporate profits ends up hurting the workers and not the capitalists residing in the small economy. **True, if capital is perfectly mobile the after tax return to investments must be equal to  $r$  which means that less capital will be invested at home if corporate profits are taxed at a higher rate at home  $\rightarrow$  capital flows out of the country. With less capital per worker wages will decline.**
  - (d) Cost benefit analysis that put equal weight on the rich and the poors' willingness to pay for public projects implicitly favor the interests of the rich. **True, if the marginal utility of money decreases with wealth a very rich person is willing to give up a lot of money to get what he or she wants. So if this person enjoys taking his snow scooter to his cottage in the mountains, and the government is eliciting individuals willingness to pay to get a more lenient regulation of motor traffic in mountains, he will state a very high amount of money.**
  - (e) The marginal cost of public funds is always above 1. Uncertain, but probably yes. The marginal cost of public funds can be defined as the amount of money the private sector is willing to give up in order not having to pay the last NOK in tax income. Since taxes distorts choices there will be an excess burden to taxation and the marginal cost of public funds will be larger than 1. But it is maybe not meaningful to define the marginal cost of public funds without considering what the marginal public budget is used on. In a Mirrelessian framework it has been argued that the marginal cost of public fund is equal to 1.
  - (f) The crucial element for the identification of the elasticity of taxable income is exogenous variation in the income tax rate. **True.Or almost true. One needs some variation in the after tax wage in order to estimate ETI, after tax wage is given by  $(1 - t)w$ . So we need either**

exogenous (to other things that matter for the reporting of taxable income) variation in  $(1 - t)$  or in  $w$

- (g) It is never optimal to complement an optimal Mirrlees income tax with a tax on consumer goods. **False.** It is optimal to complement a Mirrlessian income tax with a tax on consumption goods if the utility-function over labour and income (consumption) is not separable. So if a very high tax on golf clubs makes high wage (high skills) individuals less willing to trade leisure for consumption one could make the redistribution incentive constraint less binding by having such a golf club tax (reduce the marginal tax rate on the low skill person).

2. **Dividend tax (20%)** Explain what is meant by “double taxation of dividends.” Explain why this may be seen as harmful to investment under some condition(s), but not under other conditions. **Guide (Diderik Lund):** This refers to taxation of dividends at the personal (shareholder) level in a country which does not give (any, or not full) deduction for distributed dividends in the corporate income tax. In the curriculum this is most prominently discussed by Zodrow (1991). Zodrow and notes show that in a closed economy, full double taxation will result in a combined rate if the source of investment funds is new equity, while the use of the resulting profits is dividends. This is called the old view. The new view is that the source of investment is (mostly) retained profits. In that case, even if the use is dividends, the personal dividend tax will apply either in the investment period (in the alternative case, with dividends then, and investment in bonds) or in the profits period (in case of real investment followed by profits and dividends). Thus the personal tax on dividends is cancelled from the expressions when real investment is compared to investment in bonds. Thus it will not hurt investment to the extent that the source is retained profits. Both Zodrow and the notes show that the case with retained profits as the source leads to a combined rate of  $t + (1 - t)t$ , where  $t$  is the personal tax rate on capital gains. When comparing the two sources of funds, the impact of new shares compared to retained profits is highest when it is substantially less than  $t + (1 - t)t$ . This is the case in most countries that have double taxation of dividends, in particular when effective tax rates are considered, because capital gains are typically taxed only at realization. There is another condition under which the tax rate on dividend income for a domestic shareholder does not matter, namely when the source of equity for investment is abroad. The tax on dividend income to domestic shareholders will not apply for foreigners. A third condition is that investment could be financed by debt, not equity. Again the tax on dividend income to domestic shareholders will not apply. Realistically, all financing must have some fraction from equity. Equity could come from abroad, but for many smaller firms, there are informational problems which prevent them from attracting foreign capital, see Lindhe and Södersten (2012). Due to this, the second and third conditions cannot alleviate the problem completely.

3. **Income tax (40%)** The economy is made up of individuals with identical preferences defined over consumption  $c$  and labor  $l$ . Individuals have different productivity or wage rates. An individual with wage rate  $w$  supplying labor  $l$ , earns  $z = wl$  and consumes  $c = z - T(z)$  where  $T(\cdot)$  is the income tax.

- (a) Assume that the government imposes the following two-bracket income tax:  $T(z) = -R + \tau_1 \cdot z$  if  $z \leq \bar{z}$  and  $T(z) = -R + \tau_2 \cdot z$  if  $z > \bar{z}$ . Assume that  $0 < \tau_1 < \tau_2$  and  $R > 0$ , plot the budget constraint on a diagram in  $(l, c)$ .
- (b) Discuss the welfare effects of increasing the threshold  $\bar{z}$ . (What are the relevant arguments when discussing the costs and benefits of increasing the threshold  $\bar{z}$ ). **Increasing the threshold will reduce the marginal tax rate of those who are located just above the old threshold. This will stimulate labour supply which is a good thing since the positive marginal tax is distortionary: The marginal product of labour exceeds the marginal disutility of working. The magnitude of the gain depends on how many taxpayers are affected, how responsive their labour supply is and the size of the wage rate. Now taxes on incomes above  $\bar{z}$  diminish and the transfer must be reduced to restore a budget balance, or the government has to reduce spending on other “projects”.**
- (c) Assume now a simpler tax scheme with only one tax rate  $\tau$  that applies to all income. The utility function for each individual takes the simple form:

$$u(c, l) = c - \frac{1}{(1+k)} l^{1+k}$$

where  $k > 0$  is a given fixed parameter. Suppose there is a distribution of skills  $w$  with density  $f(w) > 0$  over  $[0, \infty)$ . The total population is normalized to one so  $\int_0^\infty f(w) = 1$ . Solve for the optimal labor  $l$  and earnings  $z = wl$  choice for an individual with wage  $w$ . Derive the uncompensated and compensated elasticities of labor supply as a function of  $k$ . Is there an income effect on labour supply?

**Labour is supplied to solve  $\max u(c, l)$  st.  $w(1 - \tau)l = c \implies \max w(1 - \tau)l - \frac{1}{(1+k)} l^{1+k}$  the foc is  $w(1 - \tau) = l^k \implies l = w(1 - \tau)^{1/k}$ . Since  $u$  is linear in  $c$  there is no income effects on labour supply. Hence, compensated and uncompensated supply is the same.**

- (d) Suppose taxes collected are all rebated through the demo-grant so that  $R = \tau Z$  where  $Z$  is average earnings. Solve for the Rawlsian optimal tax rate  $\tau$  (i.e., the tax rate that maximizes the utility of the worst-off individual). Solve for the utilitarian optimal tax rate  $\tau$  (i.e., the tax rate that maximizes the sum of utilities). In both cases, explain the intuition behind your results. **Worst off individual has  $w = 0$  and hence  $l = 0$  and utility  $u = R = \tau Z$  so Rawlsian optimal rate maximizes tax revenue (to maximize  $R$ ) and is set at the tax rate**

that maximizes the demo-grant  $\max \tau w l$  given that  $l = w(1 - \tau)^{1/k}$ . Solving this gives  $\tau^* = \frac{k}{k+1}$ . Given that all utilities are linear, there is no concern for redistribution and hence the optimal utilitarian tax rate is zero.