Guidelines for exam in ECON4620, spring 2020

The exam consists of three problems, each counts 1/3. Because of this being a open book exam, the problems asked are different from previous exams. Now they are asked to present relevant tools for the problems raised. Then they are (to some extent) asked to use standard tools on problems they have not seen before.

Problem A. Change in taxation of labor income

i. Effects of reduction in marginal tax rate

a. This problem refers to the Saez (2001), a framework which they have been introduced to as in Lecture 10. Appendix 2.A.1 in Brewer et al. (2011) provides a straightforward introduction to the main parameters: elasticity of taxable income (*e*), thinness of tail (*a*), and the value that the government sets on the marginal consumption of high-income individuals (*g*).

These text excerpts are from Lecture 10

$$dM + dW + dB = N\left(z^m - \overline{z}\right)\left[1 - g - e\frac{z^m}{z^m - \overline{z}}\frac{\tau}{1-\tau}\right]d\tau$$

Find optimal τ by setting $dM + dW + dB = 0$:

$$\tau^* = \frac{1-g}{1-g+ae}$$

If $g = 0$: $\tau^* = \frac{1}{1+ae}$ (top of Laffer-curve)

Pareto parameter (thinness of top tail), large $a \rightarrow$ thin tail: $a = \frac{z^m}{z^m - \overline{z}}$

Elasticity of taxable income: $e = \frac{\partial z / z}{\partial(1-\tau)/(1-\tau)}$

τ^* decreases in g, e and a

Consider a reform that changes the top income tax rate by $d\tau$

3 effects:

1. Mechanical increase in tax revenue

$dM = N\left(z^m - \overline{z}\right)d\tau > 0$

$N =$ the number of people earning more than $\overline{z}$

z^m = their average income, which is a function of $(1-\tau)$, $z^m(1-\tau)$

$\overline{z} =$ top bracket threhold

2. Utility (welfare) effect (welfare cost of tax increase)

$dW = -gN\left(z^m - \overline{z}\right)d\tau < 0$

3. Behavioral response reduces tax revenue

$$dB = \tau dz^m = -Nez^m \frac{\tau}{1-\tau} d\tau$$

where we have used that $dz^m = -\frac{\partial z}{\partial(1-\tau)} d\tau$ and that $\frac{\partial z}{\partial(1-\tau)} = e\frac{z}{(1-\tau)}$

b. Here the students are asked to apply the framework, i.e., discuss what have motivated the move: change in *e*, *a* and *g*. The parameters may have changed themselves, *a*, *e* and *g*, which invites to a revision of the optimal tax. In particular, there are different political parties, which means different *g*'s. In this part the students are invited to demonstrate how they can connect theory and conceptual framework to (real world) tax policy setting.

ii. Distributional effects of the tax reform in terms of compensating variation

a. Chapter 10 of Varian (1992) (in compendium) presents the theory behind the measure of compensating variation. In Lecture 11 they are introduced to how this can be done in practice, in terms of using an estimated labor supply model. Here are some excerpts from Lecture 11.

An obvious candidate to measure a tax reform is to take difference
in indirect utility between two policy regimes

$$\mathrm{v}(\mathbf{p}', m') - \mathrm{v}(\mathbf{p^0}, m^0)$$

where $\mathbf{p}'$ and $\mathbf{p^0}$ are vector of prices and m' and m^0 are incomes
under the two policy regimes, where $(\mathbf{p^0}, m^0)$ is the present situation
and $(\mathbf{p}', m')$ is the proposed change
But if the policy analyst wants to have monetary measures of the changes in welfare,
one could apply the money metric utility function, $\mu(\mathbf{q}; \mathbf{p}, m)$
The money metric utility function measures how much income the consumer
would need to have at prices **q** to be as well off as she would be facing prices **p**

The utility difference in terms of money metric utility function

$$\mu(\mathbf{q}; \mathbf{p}', m') - \mu(\mathbf{q}; \mathbf{p^0}, m^0)$$

It remains to choose the base prices **q**.
There are two obvious alternatives, may set **q** equal to $\mathbf{p}'$ and $\mathbf{p^0}$
Then we have the following two measures for the utility difference

$$EV = \mu(\mathbf{p^0}; \mathbf{p}', m') - \mu(\mathbf{p^0}; \mathbf{p^0}, m^0) = \mu(\mathbf{p^0}; \mathbf{p}', m') - m^0$$

$$CV = \mu(\mathbf{p}'; \mathbf{p}', m') - \mu(\mathbf{p}'; \mathbf{p^0}, m^0) = m' - \mu(\mathbf{p}'; \mathbf{p^0}, m^0)$$

CV defined by:
Uses the new prices as the base and asks what income change would be necessary to compensate the consumer for the price change
CV is the adjustment in income that returns the consumer to the original utility after an economic change has occurred. Compensation takes place after some change so *CV* uses the after-change prices

b. They must explain the figure; CV vs disposable income, thus two different concepts of well-being are used. They are invited to explain the benefits at the high end of the income distribution. The question regarding the difference between money metric utility and income asks is a bit narrow, but good students will say something about difference between income and more comprehensive concept of utility. If they also are able to elaborate on the distribution of leisure, it should be valued.

Problem B. The abolishment of the inheritance tax

i. The first part asks them to reproduce the framework of Kopzcuk (2013), presented in Lecture 7. Whereas argumentation is usually the other way round, they are here forced to think about why the inheritance tax should be eliminated: This leads to a discussion of efficiency losses due to inheritance taxation. In particular, if altruism is the main bequest motive, inheritance tax is harmful for efficiency (for distribution too, but that is more complicated and haven't been taught). A main argument is that it does not produce much revenue. Could also mention specifics problems for transfers of firms and entrepreneurs.

Here are some slides on this from Lecture 7 that are relevant:

Bequest motives

- Joy of giving (warm glow/egoistic)
  - The parent derives utility from the amount that is transferred to the children
    - Utility directly from the bequest
- Altruism
  - Consumers obtain utility from their heirs' utility as well as from their own consumption
    - Parents compensate their children and divide transfers unequally between children whose needs are different
    - Ricardian equivalence applies
- Exchange/strategic
  - Beneficiaries provide service in exchange for the promise of inherited wealth

Implications of motives (Laitner and Ohlsson, 2001)

Table 1
Theoretical determinants of bequests and excess burden of taxation

Model	Parent's resources	Child's earnings	Excess burden of taxation
Accidental model	+	0	No
Altruistic model	+	−	Yes
Egoistic model	+	0	Yes, if amount received matters No, if amount given matters
Exchange model	+	?	Yes

More details on double counting and Carnegie effect

Transferred to a bequest context it can be argued that one could discourage bequests (tax) in order to stimulate the work effort of the recipients
This is the same argument as in the following, based on Kopczuk (2013):
Preferences of children and parents are given by

$$u^C\left(B^P + C^C, Y^C; w\right) = u\left(B^P + C^C, \frac{Y^C}{w}\right)$$

$$u^P\left(C^P, Y^P, B^P; w\right) = v\left(g\left(C^P, B^P\right), \frac{Y^P}{w}\right)$$

and the budget constraints are

$C^C = Y^C - T^C\left(Y^C\right)$ and $C^P + B^P = Y^P - T^P\left(Y^P, B^P\right)$

And:

The Atkinson-Stiglitz theorem implies that bequest taxation would not be optimal if one considered the parental generation alone
Note that taxation is carried out at the parental level: $T^C\left(Y^C\right)$ and $T^P\left(Y^P, B^P\right)$
This eliminates the possibility that behavioral responses of children may affect the actual net-of-tax transfer, which we shall return to
Using a tax perturbation approach and employing the envelope theorem
Kopczuk (2013b) gets for the optimal marginal tax on bequest

$$\tau^B = -\beta \frac{\partial u^C}{\partial C} p^{-1} - T^{C\prime}\left(Y^C\right)\frac{\partial Y^C}{\partial B^P}$$

The first term on the right-hand side is the correction of an externality from giving:
It is negative, reflecting that a gift to children is double-blessed, because it provides both (internalized) utility to the parent and (non-internalized) utility to the child
The second term is a fiscal externality effect, which is positive,
as the marginal income tax rate is positive and income is a normal good, $\frac{\partial Y^C}{\partial B^P} \leq 0$ and $T^{C\prime} > 0$
This correponds to the so-called Carnegie effect

Double counting and the Carnegie effect influence the decision to abolish in opposite directions. This has also been discussed in Lecture 7, so this should be answered straightforwardly, not very challenging. Of course, distributional arguments should also be referred to, for example referring to the Norwegian inheritance starting at a relatively low level. The concept of “equal opportunities”.

ii. In the second part they are directed towards an argument which has to do with giving slack to the self-selection constraint. They have been introduced to this argument in several lectures, i.e. in Lecture 4 (dual income tax), Lecture 5 (commodity tax) and Lecture 13 (on public goods). But here they must use this type of reasoning with the inheritance tax as the additional tax. Not very difficult, but the reasoning is now connected to the inheritance tax. For a tax on bequests, imposed on the parent generation, can be beneficial because it relaxes the self-selection constraint following from the labor income tax. Then more redistribution can be achieved, and social welfare increases. Elimination of the inheritance tax works the other way. But the taxation of wealth distorts the bequest decision, which is harmful, also in the joy-of-giving perspective (but even more so under altruism)

The slacking of the self-selection constraint can be seen as (very simple framework from Lecture 4):

Taxation of consumption when there are three types consuming good *k*

$x_1^k, x_2^k, x_m^k,$ where *m* is the mimicker

We introduce at tax on the good, which means that we can reduce the tax on on earnings, *T*

Then because of agens already in optimum, we have simply (envelope theorem)

$$x_1^k dt^k = -dT_1$$

$$x_2^k dt^k = -dT_2$$

$$x_m^k dt^k = -dT_1$$

Only if there is difference between x_m^k and x_1^k a tax on consumption can be justifed

$$\left(x_m^k - x_1^k\right) dt^k = -dT_1$$

But Atkinson-Stiglitz theorem states that no extra information is achievable:

identical consumption function, separability between consumption and labor

C. Change in the VAT rate on food

i. The student is invited to discuss the Corlett-Hague rule, as discussed by Christiansen and Smith (2020) and as presented in Lecture 5. Here they are (again) directed towards the effect on the self-selection constraint. As we know, if food is negatively related to working hours, and thus positively related to leisure, there is less reason for letting food have a lower rate: one should tax such goods. It seems that (conventional) food items under the reduced VAT rate are negatively related to work.

Here are excerpts from slides:

Well-known that a uniform VAT on all commodities would be equivalent to a proportional tax on labor income

The question is whether and how the indirect taxation should be differentiated

A Ramsey type model

A single consumer and two marked commodities, 1 and 2, in addition to leisure, 0

A fixed wage rate is set equal to 1, q_1 and q_2 are prices of the commodities

Let σ_{ij} define the compensated elasticity for good *i* with respect to the price of good *j*

The optimization problem is to find tax rates, t_1 and t_2, to maximize indirect utility, $V\left(q_1, q_2\right)$

subject to a budget constraint (predetermined revenue requirement): $R = t_1 x_1\left(q_1, q_2\right) + t_2 x_2\left(q_1, q_2\right)$

The solution to this problem is (using Roy's identity and Slutsky equation)

$$\frac{t_1}{q_1}\sigma_{11} + \frac{t_2}{q_2}\sigma_{12} = \frac{t_1}{q_1}\sigma_{21} + \frac{t_2}{q_2}\sigma_{22}$$

We use that compensated demand functions are homogeneous of degree zero

$$\sigma_{11} + \sigma_{12} + \sigma_{10} = 0 \wedge \sigma_{22} + \sigma_{21} + \sigma_{20} = 0$$

Then we have the Corlett-Hague rule (in two versions)

$$\frac{t_1/q_1}{t_2/q_2} = \frac{-\sigma_{11} - \sigma_{22} - \sigma_{10}}{-\sigma_{11} - \sigma_{22} - \sigma_{20}} \wedge \frac{t_1/q_1}{t_2/q_2} = \frac{\sigma_{12} + \sigma_{21} + \sigma_{20}}{\sigma_{12} + \sigma_{21} + \sigma_{10}}$$

Several results

1. The commodity that is more complimentary to leisure is taxed at a higher rate

Dependent on $-\sigma_{10} > -\sigma_{20}$ or $\sigma_{20} > \sigma_{10}$ or $-\sigma_{10} < -\sigma_{20}$ or $\sigma_{10} > \sigma_{20}$

2. Trade-off between reduction on labor supply distortion and distortion of consumption bundle

For sufficiently large values of $\sigma_{12} + \sigma_{21}$, the ratio $\frac{t_1/q_1}{t_2/q_2}$ approaches 1

and the tax differentiation will vanish

3. The inverse own elasticity rule

When there is no substitution between taxed commodities

$\sigma_{12} = \sigma_{21} = 0$

Hence $\sigma_{11} + \sigma_{10} = \sigma_{22} + \sigma_{20} = 0$ and

$$\frac{t_1/q_1}{t_2/q_2} = \frac{-\sigma_{22}}{-\sigma_{11}}$$

When the revenue constraint is represented by $\alpha > 0$

we have the inverse elasticity rule

$$\frac{t_1}{q_1} = \frac{\alpha}{-\sigma_{11}} \wedge \frac{t_2}{q_2} = \frac{\alpha}{-\sigma_{22}}$$

4. The inverse cross price elasticity rule (as $-\sigma_{11} = -\sigma_{10}$)

$$\frac{t_1}{q_1} = \frac{\alpha}{\sigma_{10}} \wedge \frac{t_2}{q_2} = \frac{\alpha}{\sigma_{20}}$$

Complementarity to leisure leads to higher tax

Note also that low absolute value of the own price elasticity also reflect weak substitutability with leisure

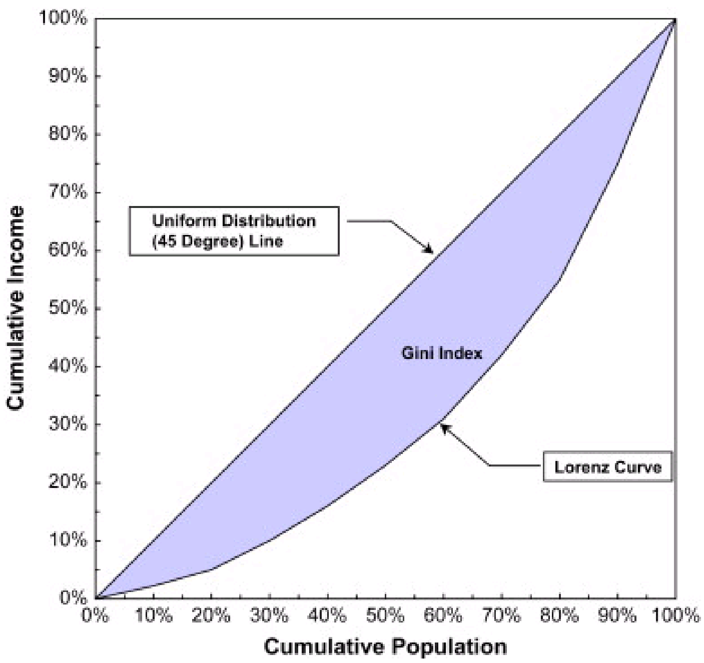
Of course, one may also refer to Atkinson-Stiglitz within a Mirrlees framework:

- A (high-skilled) mimicker is better off pretending to choosing the income level of the low-skilled type
  - Still higher wage than the low-skilled type
  - But can work less (enjoy more leisure)
- Introducing a tax on consumption means that tax on earning is reduced
  - Revenue neutrality
- Assume that the high-skilled mimicker consumes more of the good
  - A larger tax burden on the high-skilled
- But only the smaller burden of the low-skilled type is compensated
  - The mimicker is under-compensated and is made worse off
    - Mimicking has become less attractive
    - Self-selection constrained relaxed

ii. Graph showing distribution of lower tax on food

a. They should explain how the tables are derived. This should be fairly easy to answer: division into deciles and explain the difference between income and expenditures. May mention concepts such as equivalence scale.
b. Demonstrate that they understand the distribution of expenditure and income. Perhaps mention the difference between them.
c. This part is a bit more challenging as they should discuss scale invariance of inequality indices, as the Gini coefficient. The answer depends on which is distributed mote unequally, the advantages of the lower tax on food or income in deciles. I would expect that the food advantage (in terms of income advantage, blue bars) is more equally distributed than the "income". Thus, if we take away the advantage, increased burden would be relatively larger for the people at the low end of the income distribution, and inequality increases. In any case, the answer depends on which is more unequally distributed, income or the tax advantage of having lower tax on food.

The students have been introduced to the Gini coefficient and some characteristics of it



The Gini coefficient is characterized by

- Scale independence
  - Size of the economy does not matter
- Transfer principle
  - Transfer from the rich to the poor reduces ineq.