Written Exam for the B.Sc. or M.Sc. in Economics summer 2015

Public Finance

Final Exam

June 3, 2015

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by "eksamen på dansk" in brackets, you must write your exam paper in Danish.

This exam consists of 4 pages in total (excluding this front page)

You are supposed to answer ALL questions. The assignments (**1A**)–(**3E**) all carry the same weight in the assessment.

Part 1: Questions on various topics

Provide a thorough answer to each of the following questions (*highlighted in italics*):

(1A) Consider estimating the impact on taxable income of a tax reform by using the time variation in taxable income for a group affected by the reform. That is, substract average taxable income of the group before the reform from average taxable income after the reform of the same group. *Will this provide a causal estimate of the effect of the reform on taxable income?*

(1B) *Define the Pareto criterion, and discuss the shortcomings of using the Pareto criterion as a guiding principle to obtaining optimal policy.*

(1C) Consider an economy with three markets—an output market, a market for labor, and a market for capital. Assume that firms producing the output good employ labor and capital in production with a constant returns to scale technology, and that markets for output, labor, and capital are characterized by perfect competition. The government taxes labor and capital. *Who bears the burden of an increase in the tax on capital in the short run, the workers and/or the owners of capital?*

Part 2: The revenue-maximizing high income tax rate

Consider a two-bracket tax system characterized by the tax function

$$T(z) = \begin{cases} m_L z & \text{if } z \leq \hat{z} \\ m_L \hat{z} + m_H (z - \hat{z}) & \text{if } z > \hat{z} \end{cases}$$

where z is taxable income. Income below a threshold $\hat{z}$ is taxed at rate m_L, and income above $\hat{z}$ is taxed at rate m_H. There are $i = 1, \ldots, N$ taxpayers above the threshold. Taxpayers have quasi-linear preferences, so we disregard income effects. For taxpayers above the threshold, the optimum is given by $z_i = [a_i(1 - m_H)]^{\varepsilon}$, where a_i represents individual i's potential earnings level or ability level, and ε is a positive parameter.

(2A) Provide a definition of the elasticity of taxable income with respect to the net-of-tax rate $(1 - m)$, and calculate the elasticity for a taxpayer with income z above the threshold $\hat{z}$.

Consider a tax reform that raises the marginal tax rate m_H slightly by dm_H for incomes above $\hat{z}$. This induces a change in tax revenue, dR, that can be decomposed into a mechanical revenue effect, dM, and a behavioral revenue effect, dB.

(2B) Explain what is meant by the term "mechanical revenue effect", and show that the mechanical revenue effect in this case can be written as $dM = (\bar{z}-\hat{z})\cdot N\cdot dm_H$, where $\bar{z} = \frac{1}{N}\sum_i z_i$ is mean income of taxpayers above threshold $\hat{z}$.

The behavioral revenue effect can be written as $dB = -\varepsilon \cdot \frac{m_H}{1-m_H} \cdot \bar{z} \cdot N \cdot dm_H$.

(2C) Use dM and dB to show that the revenue-maximizing high-income tax rate, m_H^*, is given by

$$m_H^* = \frac{1}{1+\varepsilon\cdot\alpha},$$

where $\alpha \equiv \frac{\bar{z}}{\bar{z}-\hat{z}}$. Discuss the importance of ε and α for the revenue-maximizing tax rate.

Part 3: Extensive labor supply responses

Consider a labor market with extensive margin responses, that is, where individuals choose whether or not to work. For simplicity, disregard intensive margin responses so that an individual either works $\bar{h}$ hours inelastically or does not work at all. If an individual decides to work, her income is $Y = w\bar{h}$, she incurs a fixed cost, $q > 0$, from doing so, and pays a tax, T. If she does not work, she receives a benefit, B, lump sum. Utility is defined as

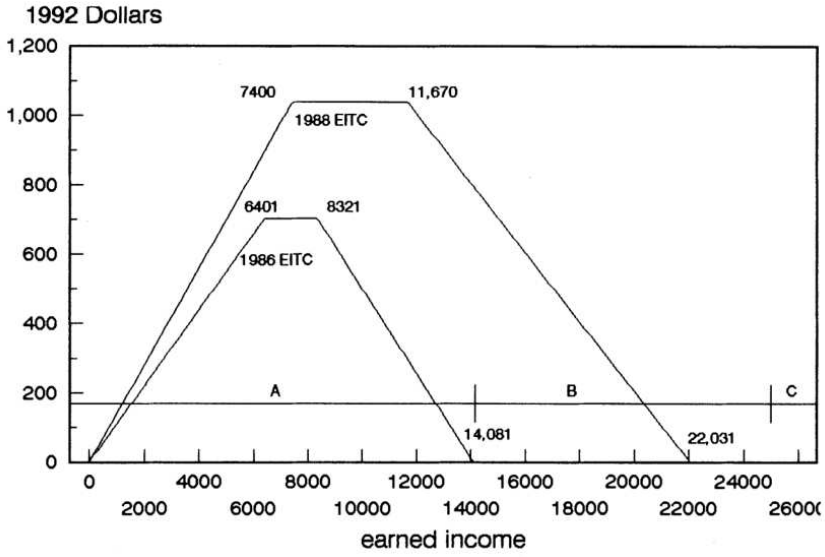
$$u = \begin{cases} Y - T - q & \text{if working} \\ B & \text{if not working} \end{cases}$$

The fixed cost, q, is distributed heterogeneously across individuals according to a density function $f(q)$ with cumulative distribution function $F(q)$.

(3A) Derive the fixed cost of the marginal individual just willing to work, call it $\bar{q}$, and depict $\bar{q}$ together with $f(q)$ in a diagram (with q along the primary axis and $f(q)$ along the secondary axis). What is the employment rate in the diagram?

(3B) How does $\bar{q}$ and employment depend on the tax and the benefit? Provide an economic interpretation.

In the paper "Labor Supply Response to the Earned Income Tax Credit" by Eissa and Liebman (published in the Quarterly Journal of Economics in 1996), the authors investigate the effect of the 1986 expansion of the earned income tax credit (EITC) for single women with children on their labor force participation. The expansion came as a part of the famous tax reform known as the Tax Reform Act of 1986 (TRA86). The EITC (in Danish: "beskæftigelsesfradrag") offers a tax credit for eligible individuals contingent on earning positive income and having a qualifying child. Below is a copy of Figure IV from the article, showing the structure of the EITC pre and post reform.



(3C) Explain how an EITC may affect labor force participation in the context of the model presented above. How do you expect the reform to affect labor force participation of the targeted group?

Eissa and Liebman (1996) use the reform to estimate the impact of the EITC expansion on labor force participation of single women with children. Below is a copy of Table II from the article showing their main estimate.

TABLE II
LABOR FORCE PARTICIPATION RATES OF UNMARRIED WOMEN

	Pre-TRA86 (1)	Post-TRA86 (2)	Difference (3)	Difference-in-differences (4)
A. *Treatment group:*				
With children [20,810]	0.729 (0.004)	0.753 (0.004)	0.024 (0.006)	
Control group:				
Without children [46,287]	0.952 (0.001)	0.952 (0.001)	0.000 (0.002)	*0.024 (0.006)*

(3D) Describe carefully the identification strategy behind the empirical analysis (what is the setup, what are the main assumptions, etc.), and explain, using Table II above, how the authors arrive at their estimate. Does their estimate have the expected sign, given your argumentation in (3C)?

The model of labor force participation we have used above disregards intensive margin responses, which is clearly a simplification.

(3E) Consider a proportional tax system and the introduction of a US-type EITC (with a phase-in region, a plateau region, and a phase-out region) in such a system. Discuss the possible labor supply effects along the intensive margin. [Hint: think about income and substitution effects, and how behavioral responses may differ across income regions.] Is it possible from theory to say whether intensive margin responses increase or decrease aggregate number of working hours?