Written Exam at the Department of Economics winter 2019-20

Public Finance

Re-Exam

February 18, 2020

(3-hour closed book exam)

Answers only in English.

This exam question consists of 5 pages in total including this front page.

Falling ill during the exam

If you fall ill during an examination at Peter Bangs Vej, you must:

- contact an invigilator who will show you how to register and submit a blank exam paper.
- leave the examination.
- contact your GP and submit a medical report to the Faculty of Social Sciences no later than five (5) days from the date of the exam.

Be careful not to cheat at exams!

You cheat at an exam, if during the exam, you:

- Make use of exam aids that are not allowed
- Communicate with or otherwise receive help from other people
- Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text
- Use the ideas or thoughts of others without making use of source referencing, so it may appear to be your own idea or your thoughts
- Or if you otherwise violate the rules that apply to the exam

You are supposed to answer ALL questions. All of the questions (1A)-(3E) will carry the same weight in the assessment.

Part 1: Extensive labor supply responses

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 labor force participation effect of the 1986 expansion of the earned income tax credit (EITC) for single women with children. The EITC (in Danish: "beskæftigelsesfradrag") provides a tax credit for eligible individuals with a qualifying child. The size of the tax credit is a function of the individual's earned income as illustrated in the figure below. The figure is a copy of Figure IV from the article, showing the structure of the EITC before the reform and after the reform.

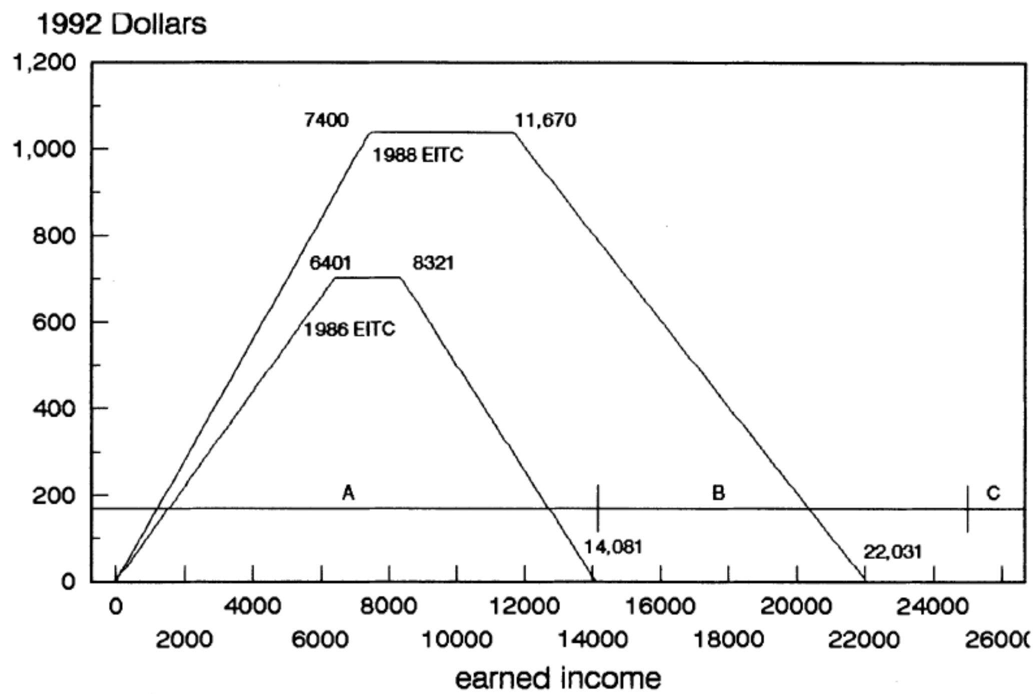

FIGURE IV
1986 and 1988 Earned Income Tax Credit

(1A) Explain how an EITC may affect labor force participation (i.e. what we may expect theoretically).

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)*

(1B) What is the key estimate in Table II? Describe the empirical analysis and explain how the authors arrive at their estimate.

(1C) What is the main identifying assumption(s) needed for the estimate to be the causal effect of the EITC on the labor supply of single women with children? Describe the possibilities of validating the assumption(s).

Part 2: Capital taxation in the short run and in the long run

Consider an economy where firms hire labor (L) and rent capital (K) to produce output (Y) according to the following Cobb-Douglas production function

$$Y = K^{\alpha} L^{1-\alpha}. \tag{1}$$

All markets are perfectly competitive and the wage rate (w^D) and the rental rate (r^D) that firms pay therefore equal the marginal product of labor and capital, respectively. Both labor and capital income are taxed so that the after tax wage rate that workers receive (w^S) and the after tax rental rate that capital owners receive (r^S) are given by

$$w^S = (1 - t_L)w^D \tag{2}$$

$$r^S = (1 - t_K)r^D. \tag{3}$$

Finally, assume that workers supply labor according to an aggregate labor supply function $L(w^S)$ with a constant elasticity ε. Log transformation of the equations and total differentiation yields the following five model equations

$$\hat{w}^D = \alpha\left(\hat{K} - \hat{L}\right), \tag{4}$$

$$\hat{r}^D = -(1-\alpha)\left(\hat{K} - \hat{L}\right), \tag{5}$$

$$\hat{w}^S = \hat{w}^D, \tag{6}$$

$$\hat{r}^S = -\frac{dt_K}{1-t_K} + \hat{r}^D, \tag{7}$$

$$\hat{L} = \varepsilon \hat{w}^S, \tag{8}$$

where $\hat{x} = dx/x$ is the percentage/relative change in x. We have also used $dt_L = 0$ since we only focus on changes in the tax on capital.

We distinguish between the effects of a change in the capital tax in the short run and in the long run. In the short run, the capital stock is assumed fixed ($K = \overline{K}$). In the long run, the capital stock is assumed to be perfectly elastic implying that the after-tax rate of return on capital is equal to the exogenous world interest rate level ($r^S = \overline{r}$). Using equations (4)–(8), it is possible to derive the following equations:

$$\hat{w}_S^{\text{Short}} = 0 \ , \ \hat{r}_S^{\text{Short}} = -\frac{dt_K}{1-t_K}, \tag{9}$$

$$\hat{w}_S^{\text{Long}} = -\frac{\alpha}{1-\alpha}\frac{dt_K}{1-t_K} \ , \ \hat{r}_S^{\text{Long}} = 0, \tag{10}$$

where superscript "Short" denotes the effects in the short run, while "Long" denotes the effects in the long run.

(2A) Define the concept of tax incidence.

(2B) How do the equations in (9) and (10) inform us about the tax incidence predicted by the model? Discuss based on these predictions how a government, who seeks to collect tax revenue from capital owners, will find conflicting incentives in the short and long run.

(2C) Describe the economic intuition underlying the predictions of the model described in question 2B.

(2D) Show how to derive equations (9) and (10) from the model equations (4)–(8).

Part 3: Social Insurance: Adverse Selection

Consider an economy where individuals face a risk of becoming unemployed. If they become unemployed they incur a loss of income $d = 1$ assumed to be the same for all individuals. The risk of becoming unemployed θ is exogenous and heterogeneous across individuals. Assume that θ is uniformly distributed between $[0, 1]$ in the population. The individuals' willingness to pay for an insurance that fully compensates them for the income loss in the case of unemployment is given by:

$$w(\theta) = (1 + \alpha)\,\theta, \tag{11}$$

where $\alpha > 0$.

(3A) Describe intuitively why α may be interpreted as a measure of risk aversion.

(3B) What share of the population would be covered by insurance in the first best allocation, i.e. with perfect information?

Assume now that the risk parameter of an individual θ is private information. Consider a private insurance market with a public subsidy to unemployment insurance, where the subsidy implies that individuals only pay a fraction $(1 - s)$ of the market market price (π). Hence only individuals with a willingness to pay above $\pi\,(1 - s)$ buy insurance. Assuming that the market is characterized by perfect competition, the market equilibrium price (π^*) is given by:

$$\pi^* = E\left[\theta \cdot d\,|w(\theta) > \pi^*\,(1 - s)\right] = E\left[\theta \,\middle|\, \theta > \frac{\pi^*\,(1 - s)}{1 + \alpha}\right] \tag{12}$$

(3C) Provide an interpretation of equation (12), and explain why a market with perfect competition and free entry of insurance companies leads to the market equilibrium price given by this equation.

(3D) Show that the market equilibrium price equals $\pi^* = \frac{1+\alpha}{1+2\alpha+s}$. [Hint: recall that if a variable x is uniformly distributed on the interval $[0, 1]$, then the average of x over an interval from y to 1 is $E(x\,|x > y) = \frac{y+1}{2}$].

(3E) How does an increase in the subsidy affect the market price and the share of insured people? Is it possible for a social planner to achieve the first best allocation in (3B) by setting an appropriate subsidy level?