

ECON 141: Public Economics

2024 Honors Exam

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Congratulations on finishing Swarthmore's seminar in public economics!

There are **140 points** on this exam. Part I (60 points) comprises eight short-answer questions: you may choose any six of these to answer. Parts II (40 points) and III (40 points) are longer, model-based exercises with multiple questions each. Please allocate your time roughly in proportion to these point totals.

Good luck!

I. Short Answer Questions (60 points)

Please answer **six** of the following **eight** questions. Answer each with a few (3-6) sentences. Each question is worth 10 points.

Tips: Math and/or graphs are *not required*, though you are welcome to write anything that is useful. For true/false questions, credit depends entirely on your explanation. Cite any class readings or material as appropriate.

1. The first fundamental theorem of welfare economics provides conditions under which a competitive equilibrium is Pareto efficient. What conditions does this theorem rely on? Would a social planner ever prefer a Pareto-inefficient outcome?
2. A large literature in public economics tries to estimate the value of amenities and public goods through (for instance) their impact on housing prices. Briefly describe this approach, picking any example from class that comes to mind. What assumptions does this approach require?
3. Discuss: *“There is no social decision (voting) rule that converts individual preferences into a consistent aggregate decision without either (1) restricting the type of preferences assumed for voters or (2) imposing a dictatorship.”* Is this true, false, or uncertain? Why? What if we assume that preferences are ‘single-peaked’?
4. Discuss: *“Empirical analysis has shown that expanding the availability of public health insurance has little to no impact on healthcare utilization or self-reported health.”* Is this true, false, or uncertain? Why?
5. Ida May Fuller (1874-1975), the first recipient of Social Security, contributed \$24.75 into Social Security and received \$22,888.92 in her lifetime. Why did Mrs. Fuller receive so much relative to today’s beneficiaries? What determines the benefits of today’s recipients of Social Security?
6. In the United States, retail prices are usually not tax-inclusive. For instance, a \$7.99 hammer at Swarthmore True Value Hardware costs \$8.47 after a 6% Pennsylvania sales tax is applied. What does empirical work tell us about whether tax-inclusive prices matter for consumer demand?
7. The Tiebout model describes a mechanism for public goods to be optimally provisioned across places. What assumptions does this model make? Describe a real-world setting in which Tiebout sorting may be plausible.
8. Consider two government policies, Policy A and Policy B. Economists estimate that the marginal value of public funds for Policy A and B are \$2 and \$1, respectively, per dollar spent on each program. Would a social planner always find it desirable to spend less on policy B and more on policy A, all else equal? Why or why not?

II. Deadweight Loss and Tax Incidence (40 points)

The borough of Swarthmore would like to build a park, financed by a new sales tax applied to consumers. Conveniently, only two items are bought and sold in the Borough: pizzas from Renato's and bagel sandwiches from Hobbs.¹

Let P_H and P_R denote the price paid by consumers for bagels from Hobbs and pizzas from Renato's, respectively. The Swarthmore economics department has been contracted to estimate consumer demand curves:

$$\begin{aligned} D_H &= 300 - 20P_H && (\text{demand for bagels at Hobbs}) \\ D_R &= 135 - 3P_R && (\text{demand for pizzas at Renatos}) \end{aligned}$$

The supply of each good is perfectly elastic, with $P_H = 10$ and $P_R = 15$.

1. (5 points) Please graph each market and solve for equilibrium.
2. (5 points) Please compute the price elasticity of demand for each good.

Motivated by their strongly-held Quaker principles, the Borough initially considers an specific tax of \$1 for each good purchased, assessed on (and fully internalized by) consumers.

3. (10 points) Please draw a new graph showing how this tax impacts each market. Solve for the new equilibrium quantities. How much tax revenue is raised? What is deadweight loss induced by the tax?
4. (5 points) Please compare the deadweight loss of this tax against an alternative \$0.50 specific tax. Support your answer graphically or analytically, and provide economic intuition.
5. (10 points) A member of Swarthmore's city council suggests that we can generate the same amount of revenue with less *deadweight loss* by charging different specific taxes (measured in dollars) on each good. Please propose a new set of specific taxes for each good that generates at least as much tax revenue with less deadweight loss (compared to a \$1 tax on each good), and explain why.
6. (5 points) A passionate group of activists at Swarthmore, Eta Pi, has formed to oppose your proposed tax plan. They argue that our analysis has not captured equity considerations in taxation. Do they have a point in principle? What information could they present that might make you reconsider your plans?
7. (Bonus: 5 points) Suppose that we don't know the demand curves in each market, and we need to estimate them. Describe an experiment that you could run to estimate the price elasticity of demand for each good.

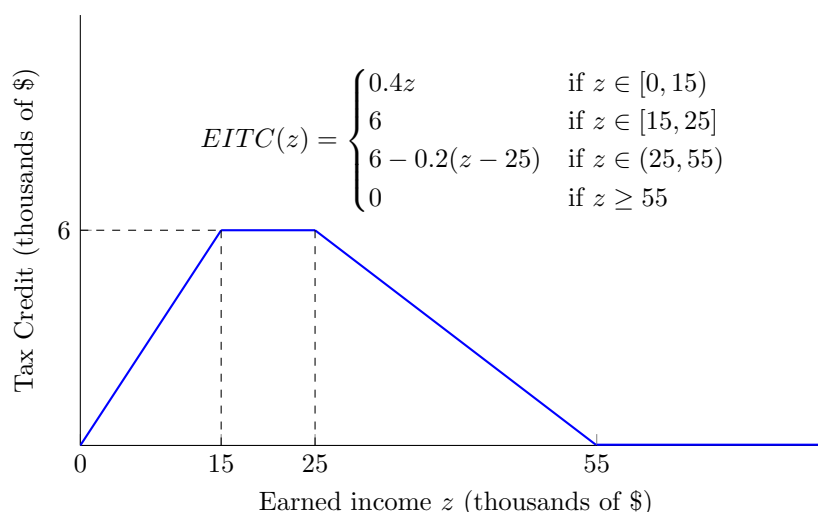
¹Specifically, Bagel #4: Pesto, tomato, and fresh mozzarella.

III. The Earned Income Tax Credit (40 points)

The President has hired you as an economic advisor, where your job is to provide advice on the administration's potential reforms to the Earned Income Tax Credit (EITC).

Households make decisions about how much to consume and work. We will assume that households can purchase a consumption good at a price we will normalize to 1, and households can work for a wage of w per unit of labor ℓ . You may assume that households have 'well-behaved' indifference curves with respect to consumption (or income) and leisure; that is, household utility is increasing in both consumption (or income) and leisure, with diminishing marginal utility.

In the first part of this problem, we will consider the following Earned Income Tax Credit-type program, where z indicates earnings $z = w \times \ell$:

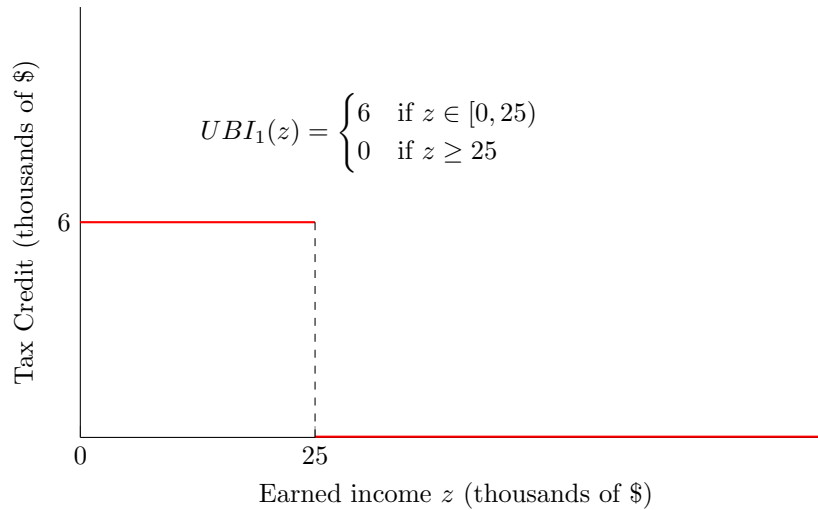


In words, this credit has a phase-in region between incomes of \$0 and \$15,000, where each dollar of earned income is accompanied by a tax credit of 40 cents. The credit has a plateau region between \$15,000 and \$25,000, where earners receive the maximal credit of \$6,000. The income phases out between \$25,000 and \$55,000, where each dollar earned decreases the credit amount by 20 cents.

1. (5 points) Please draw a graph documenting how the EITC modifies the household's budget constraint, with earnings z on the y-axis and leisure h (the opposite of labor supply) on the x-axis. What is the slope of the budget constraint without the EITC? What is the slope of the budget constraint with the EITC?

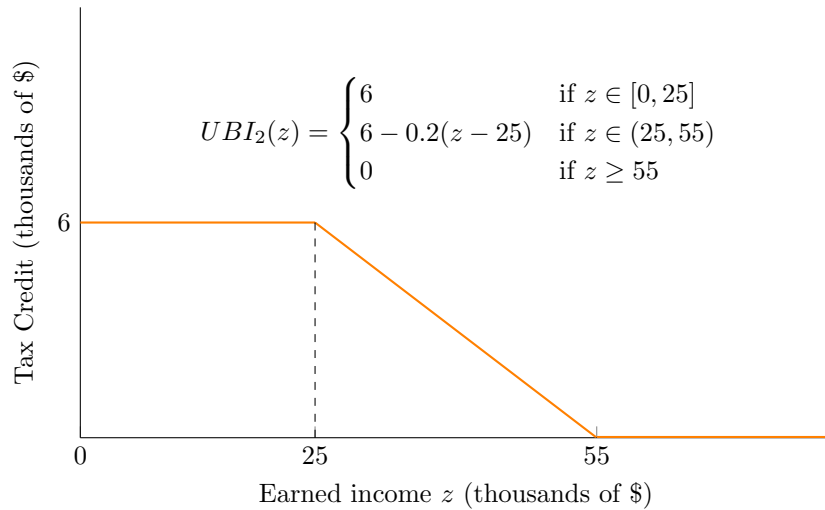
2. (10 points) How does the EITC change the labor supply decision of a household who would have chosen to not work without the EITC? Please indicate this by drawing the appropriate indifference curves on your previous graph (or on a new graph if you like), and relate this to income and substitution effects.

The administration is considering replacing the EITC with a proposed tax credit they are marketing as Universal Basic Income. Under this proposal, individuals who earn below \$25,000 receive a tax credit of \$6,000, and no credit otherwise:



3. (10 points) How does this UBI program compare to the EITC? Explain by contrasting a household's budget constraint under each credit. What would an individual who earned \$30,000 under the EITC choose to do if this UBI program is passed? Why?

The administration has listened to you, and they now propose a different tax credit they call UBI 2, which takes the form shown below:



4. (10 points) You want to describe to the President how UBI 2 would affect work incentives relative to the existing EITC. Describe how replacing EITC with UBI 2 would change earnings for an individual who earned \$0, \$10,000 \$20,000, and \$30,000 (pre-benefits) under the previous EITC system – consider each case separately. Where relevant, relate the change in labor supply caused by UBI 2 to the income and substitution effects.
5. (5 points) In the real world, many workers cannot easily choose how many hours they want to work, and instead make an extensive margin decision about whether to work or not. How might this impact the work incentives of the EITC and the UBI 2 program we studied for low-wage workers?