

Fall 2009 14.41:
Final Exam

Professor Jonathan Gruber

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- Please answer the following questions in your blue book, one question per blue book.
- No credit will be awarded for answers without explanations.
- Calculators are allowed, but no points will be taken off if you are unable to simplify a mathematical expression.
- Point totals are provided next to each question; the suggested number of minutes to spend on each question *roughly* corresponds to the point allocations. There are a total of 175 points on the exam.
- Solutions should be to-the-point and brief, though key points required to substantiate a solution must be clearly stated.
- You will have 175 minutes to complete the exam.

There are six questions. You are required to answer all questions. Good luck!

Section I: True/False/Uncertain

Question One (50 Points)

Please state whether the following claims are True, False, or Uncertain. No credit will be awarded without an explanation. Include a diagram/equation where appropriate.

- (a) **Claim:** Special interest groups compensate for the inefficiencies of the median voter outcome.
- (b) **Claim:** With respect to handling moral hazard, the government often has a comparative advantage relative to private insurance markets.
- (c) **Claim:** If the revenue from payroll taxes is spent to extend health insurance coverage to the uninsured, then there will be no deadweight loss in the labor market from the tax.
- (d) **Claim:** It is less efficient for the government to allow a tax deduction for charitable giving than for the government to spend directly on charity.
- (e) **Claim:** A non-refundable tax credit is more vertically equitable than a refundable tax credit of identical magnitudes.
- (f) Suppose that under conservative leadership, the US issues education vouchers. The average public school standardized exam scores immediately fall relative to private school performance. **Claim:** This indicates a failure of (predicted) competition between public and private education.
- (g) **Claim:** Conditional on means-testing a redistributive program, there is no advantage to further imposing categorical eligibility restrictions.
- (h) Suppose the federal government were to implement a revenue-neutral shift from an income tax to a consumption tax. **Claim:** Such a transition would improve both efficiency and equity measures.
- (i) **Claim:** Commodity taxes should be assigned so that only the most inelastically demanded good is taxed.

- (j) Risk-averse individuals prefer to smooth their consumption across possible states of the world. **Claim:** There is no need for the government to provide disability insurance, as the private market would provide this insurance absent government intervention.

Section II: Short Essays

Please respond to the following short essay prompts with concise, yet carefully reasoned arguments. Be aware of the time/point allocations.

Question Two (15 Points)

You are hired as a consultant to a prominent politician, who is proposing an overhaul of US social insurance programs. Specifically, you are asked to draw upon your theoretical understanding and relevant empirical results from 14.41 to produce a proposal for modifying benefit generosity across the following programs:

- Unemployment Insurance
- Workers' Compensation
- Disability Insurance

In your response, be sure to include a brief discussion of current relative benefit generosity across these programs and whether these current generosity levels are consistent or inconsistent with the theoretical and empirical results discussed in the course.

Question Three (15 Points)

Suppose that to finance health care reform, President Obama is considering two competing tax reforms to finance the expansion:

- Reform A: Eliminate the tax-advantaged status of premiums for employer-sponsored health insurance for all workers.
- Reform B: Impose a new payroll tax, comparable in magnitude to the uncapped Medicare component of the FICA payroll tax, leaving all other institutional details in place.

Incorporating relevant *empirical* results from the course where appropriate, briefly discuss:

- The equity implications of each reform.

- The efficiency implications of each reform.
- The presence (or absence) of a theoretical equity-efficiency tension involved in tax reform, both generally and as specifically relates to these reforms.
- Evaluation: Which proposal would you support?

Section III: Structured Responses

Question Four (25 Points)

Motivation: In 1993, manure runoff from dairy feedlots along rivers contributing to Milwaukee's water supply was implicated in a *Cryptosporidium* outbreak in that city, the nation's largest waterborne disease event to date. Over 400,000 persons fell ill with diarrhea, cramps, fever, and vomiting, and at least 54 died.

Setup: Suppose that the agricultural production of hogs (pigs) create water pollution that results in serious health conditions for both humans/animals that rely on those water sources.

Specifically, assume that the market supply function is given by

$$H_S = 6 \cdot P$$

where H_S is the quantity of hogs supplied to the market and P is the market price for hogs.

Similarly, assume that the market demand function is given by

$$H_D = 300 - 3 \cdot P$$

Further, assume that hog production imposes *total* external medical costs (M) on nearby communities, quantified as

$$M = 2 \cdot H$$

where M is measured in dollars and H is the number of hogs produced.

- (a) (2 Points) Identify the relevant externality (consumer/producer, positive/negative).
- (b) (5 Points) Sketch the market for hog production and identify the corresponding DWL in the market resulting from the externality identified in part (a). (Do not calculate.)
- (c) Suppose that property rights to clean drinking water are assigned to the neighboring communities. Further assume that hog production is common on numerous small farms in the area.

- (i) (3 Points) Briefly discuss the potential Coasian outcome.
 - (ii) (2 Points) Determine whether or not the private market solution is likely to succeed in this context.
- (d) Concerned about the outbreaks of waterborne disease, the federal government decides to intervene in the hog market.
- (i) (4 Points) If imposing a price control, what corrective Pigouvian tax τ in the hog market will lead to the socially optimal level of hog production?
 - (ii) (4 Points) (If instead imposing a quantity control, what production cap H_{max} in the hog market will lead to the socially optimal level of hog production?
 - (iii) (5 Points) Suppose that the exact specification of the H_S , H_D functions are unknown to the government planner, but that the M function is known with certainty. In this context, is it possible to say for certain whether a price control or quantity control approach is preferred?

Question Five (35 Points)

Consider the case of a single woman, Grace, who is deciding how many hours to work each month. Suppose she is limited to working a maximum of 200 hours per month. She has no other source of labor income. If she works, she receives a wage of \$10 for each hour worked. However, a payroll tax on labor income ($\tau=0.10$ or 10%) is assessed on the worker for all labor income and is present throughout the problem. Assume Grace's utility function over division of total labor supply endowment per month between leisure (L) and all other consumption expenditure (C) takes the following form:

$$U = 6 \cdot \ln(L) + 4 \cdot \ln(C)$$

- (a) (2 Points) Sketch the budget constraint facing Grace in leisure (L) and other consumption expenditure (C) space.
- (b) Solve for Grace's optimal choice of labor supply.
 - (i) (4 Points) How many hours of work will she provide?

- (ii) (1 Points) What is the corresponding level of her other consumption expenditure (earned income - payroll taxes)?

Suppose the state government introduces a work incentives program similar to the EITC to promote work among low-earning workers. Under this program:

- Workers receive a 20% government refundable tax credit for wages on the first \$500 of earned income. The maximum subsidy, then, is \$100.
 - Workers retain the full \$100 credit for earnings above \$500, provided that total earned income does not exceed \$700.
 - Workers whose earned income exceeds \$700 have their credit amount reduced by 20% of earned income above \$700 up to the point that the credit is \$0.
 - The credit is fully phased-out at \$1200 of earned income, and workers whose earned income exceeds \$1200 receive no credit.
- (c) (5 Points) Demonstrate graphically the revised budget constraint facing Grace. Label interesting facets of the budget constraint.
- (d) (4 Points) Calculate the effective marginal tax rate (EMTR) and average tax rate (ATR) at the following earnings levels both BEFORE and AFTER implementing the labor subsidy program:
- (i) Earned Income = \$100
 - (ii) Earned Income = \$600
 - (iii) Earned Income = \$1000
 - (iv) Earned Income = \$1400
- (e) (4 Points) Intuitively, how might you expect labor supply throughout the economy to respond to the imposition of this work subsidy program, assuming heterogeneity (differences) in preferences over L and C across agents? Be explicit about responses for agents with various optimal initial labor allocations, differentiating along intensive/extensive margins. Is the impact on total labor supply positive, negative, or ambiguous?
- (f) Solve for Grace's optimal choice of labor supply.

- (i) (7 Points) How many hours of work will Grace now provide?
- (iii) (2 Points) What is her level of other consumption expenditure (earned income - payroll taxes + credit)?
- (iv) (1 Points) How has her labor supply changed from in (b) and how has her level of other consumption expenditure changed?
- (v) (1 Points) How has the work subsidy program impacted Grace's welfare?
- (g) (4 Points) Briefly discuss the advantages and disadvantages of the EITC structure relative to the structure of TANF (cash welfare) program from the social planner's perspective.

Question Six (35 Points)

Consider an economy that is composed of identical individuals who live for two periods. These individuals have preferences over consumption in period 1 (C_1) and period 2 (C_2) given by:

$$U = \ln(C_1) + \ln(C_2)$$

Each individual's lifetime budget constraint is given by:

$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

Where Y_1 (=100) and Y_2 (=50) denote labor income in periods 1 and 2 respectively, and r (=0.10) is the risk-free interest rate. Individuals choose consumption in each period by maximizing lifetime utility subject to this lifetime budget constraint. Notice that bequests do not enter the framework, thus individuals will consume all remaining wealth in period 2.

- (a) (5 Points) Calculate the individual's optimal consumption in each period. Determine the level of savings in the first period.
- (b) Suppose the government decides to set up a social security system. This system will tax each individual \$10 in the first period, invests the revenue at a riskless rate of return r , and transfers the fund back to the individual with interest in the second period.

- (i) (2 Points) Specify the name for this type of social security system.
- (ii) (4 Points) Write out the new lifetime budget constraint. Calculate the impact of the system on the amount of private savings. Calculate the impact of the system on national savings.
- (c) Now suppose that the existence of the social security system results in individuals retiring in period 2, so individuals receive no labor income in period 2.
- (i) (4 Points) Solve for the individual's revised optimal consumption in each period.
- (ii) (3 Points) Calculate the new level of private and national savings. Does this differ from the level of savings in part b, and if so, why (explain intuitively)?
- (d) Now consider the actual US social security system.
- (i) (4 Points) Does social security theoretically lead to early retirement? Explain.
- (ii) (4 Points) Discuss the *empirical* evidence on the relationship between social security and retirement both domestically (US) and internationally.
- (e) (4 Points) Now suppose the US transitions to a privatized system of individual accounts, such that individual's invest their social security taxes as they prefer (including the stock market) and can withdraw the money anytime after age 62 regardless of work status. Discuss the impact on retirement. Discuss the impact on private and national savings (be clear about your assumption about the return to savings in this system versus the current system).
- (f) (5 Points) Contrast two alternative reforms to the current social security system, listing several (2+) pros and (2+) cons of each reform:
- Overhaul the current system, transitioning to a system of privatized individual accounts.
 - Invest the trust fund in the stock market rather than treasury bonds, leaving other institutional details in place.

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