Final Exam

14.41 Public Finance and Public Policy

Last Name (Please Print): _____

First Name: _____

You have three hours (180 minutes) to complete this exam, starting from when it is downloaded from Canvas and ending when your answers are fully uploaded to Canvas. There are 180 points in total, so plan to spend about one minute per point. Good luck! Please message Evan or Diana on Zoom with questions. In case of a technical emergency, please email your answers to Evan (esoltas@mit.edu).

1 Short Answer [40 points, 4 points each]

(1) Many of the United Kingdom's largest metropolitan areas have recently formed "Combined Authorities" that centralize control of transportation infrastructure investment, taking control away from the central city and suburban town governments. Explain why this reorganization should increase the equilibrium level of investment in a metropolitan area.

(2) The mayor of Largetown proposed a tax on sodas larger than 16 ounces in an effort to combat rising obesity rates. Coca-Cola immediately reacted saying that the government was being paternalistic and should let people choose what to consume. They argued that soda is not addictive so it shouldn't be taxed. Suppose everything Coca-Cola said is true, under which conditions would it still be optimal to introduce the soda tax? If, in general, consuming soda does have negative externalities, is the proposed tax the best way to internalize them?

(3) While climate scientists have stressed the potential damages from climate change, economists are less certain about the costs of mitigating greenhouse gases. Suppose that total benefits of a given level of abatement a are known with certainty and given by $B = 6ln(a)$. The cost of abatement is uncertain: there is equal probability that it will be either $C_1 = \frac{1}{2}a^2 + ga + 16$ or $C_2 = \frac{1}{2}a^2 + (g-1)a + 15$ for some value of $g \in (-\infty, -5) \cup (-4, \infty)$. Which regulatory mechanism (i.e. price or quantity), should the government choose to minimize deadweight loss?

(4) Since the 2017 tax reform, state-and-local tax payments are partially deductible on the federal income tax. Is this consistent or inconsistent with the Haig–Simons definition of income? Discuss.

(5) "While the optimal carbon tax does not depend on the supply or demand elasticities of carbon emissions, the deadweight loss from not taxing carbon does." Explain why.

(6) Under the child care tax credit, taxpayers can reduce their income tax bill by \$0.20 for every \$1 in child care expenses they pay. Suppose you wanted to predict the incidence of an increase to a 40-percent credit. Which two elasticities do you need? For one of them, propose a quasi-experimental design that would allow you to estimate it, and make up its value. Is any class material informative about the other elasticity?

(7) Suppose that the McDonald's Corporation faces a statutory corporate tax rate of $\tau = 21$ percent. To simplify, we will say that McDonald's has one type of capital asset, which depreciates exponentially at $\delta = 20$ percent per year. There is no investment tax credit. McDonald's discount rate is $\rho = 8$ percent per year. What is McDonald's effective corporate tax rate?

(8) The U.S. income tax code allows investors to reduce their tax burden by deducting losses in prior years from their current taxable investment income, but they cannot receive a tax refund. How does this "carryforward" rule affect risk-taking? Compare the rule to one in which investors with large losses could receive an immediate tax refund. Why might the U.S. have the "carryforward" rule, instead of this option?

(9) In the 1970s, Yale University offered incoming students a choice between two ways of financing their tuition: a traditional loan or a repayment plan that would "tax" a share of their income over their lifetime—one approximately equal to the value of the loan as a share of the average Yale graduate's lifetime income. This experiment was a disaster, costing Yale millions of dollars in the long run. Explain the key economic flaw with Yale's plan.

(10) In 2018, the Swiss government began sharing once-secret data on Americans' foreign bank accounts with the U.S. government, making it harder for the super-rich to evade taxes. Explain how this policy change changes the maximum amount of revenue that can be raised by the U.S. income tax system.

2 All in the Family [45 points]

Consider a simple model of an economy with identical workers who earn labor income of w when working and receive non-labor income of 5 regardless of their employment status. Individuals have identical utility functions and consume everything they earn (i.e. there is no saving) $u(c) = \ln(c)$. All workers start out employed and then lose their jobs with probability p and receive 0 in labor income.

(a) In the absence of unemployemnt insurance, what is the expected utility of each worker? [3 points]

(b) The government is considering implementing unemployment benefits of b, financed by a lump sum tax τ on the $(1-p)$ workers who do not lose their initial jobs. What is the government's budget constraint for an actuarially fair insurance program? [3 points]

(c) Solve for the optimal level of benefits and the associated tax. What is the level of consumption smoothing provided by the unemployment benefits? [4 points]

(d) Are there gains or losses from introducing insurance? How does the form of the utility function affect the desirability of a UI system? [5 points]

(e) Suppose now that, in addition to their non-labor income, when workers lose their jobs they receive support from their family, expressed by F where $F < (1-p)w$. Calculate the optimal level of unemployment benefits accounting for the family contribution. How does this compare to the level in part (c)? [5 points]

(f) Suppose now that instead of a fixed amount as above, families help during unemployment by providing a fraction f of the net income loss, i.e. $f(w-b)$, where b is the unemployment

benefit. What level of unemployment benefit would the government like to provide now (solve in terms of f)? [4 points]

(g) In the model of part (f), what would the optimal benefit level be if $f = 1/3$ and the wage was $w = 14$. [3 points]

(h) How does your answer change if $f = 1/2$. Explain this result. Is this likely to be politically feasible? [4 points]

(i) Suppose the government decides to increase coverage from 26 weeks to 39 weeks (i.e. a 13-week coverage increase). They hire you as an advisor and show you a table comparing the unemployment duration of individuals who receive UI and those who do not. The table shows that people who receive UI benefits remain unemployed for longer than people who don't receive benefits. They tell you that this proves that UI causes longer unemployment duration and the 13 weeks of additional coverage should be eliminated.

1. Is their claim correct? Why or why not? [4 points]
2. Propose an empirical strategy that would be better for understanding the relationship between UI generosity and unemployment duration. State which natural experiment would help you (you can describe the one discussed in the book or come up with another one). [5 points]
3. If UI causes longer unemployment duration, does this prove that the generosity of the program should be reduced? Why or why not? [5 points]

3 "The Best Insurance That Money Can't Buy" [40 points]

Consider a household earning an annual income y which has preferences $u(c, m, l)$ over consumption c, medical expenses m, and leisure l. The utility function obeys a standard property: marginal utility is always positive but diminishing in c, m, and l.

(a) Suppose that the household lives in a U.S. state where only households with incomes below $\bar{y}$ are eligible for Medicaid. The state pays for its Medicaid policy by a flat payroll tax rate τ. Draw the household's budget set in consumption–leisure space. [6 points]

(b) What is the slope of the budget constraint? Are there any discontinuities? Are there any ranges of income y that no household would choose to earn? [3 points]

(c) The state chooses to expand Medicaid eligibility from $\bar{y}$ to $\bar{Y}$, where $\bar{Y} > \bar{y}$. It does so with federal dollars, so the payroll tax rate does not change. Draw the new budget set versus the old budget set. Identify a household whose labor supply will (i) be unaffected by the policy change, (ii) decrease due to the policy change, and (iii) increase due to the policy change. [9 points]

(d) The U.S. spent $639 billion on the Medicaid program in 2019. It could have simply transferred these resources to low-income households as a cash benefit. Provide and explain three distinct reasons for an in-kind benefit in the case of Medicaid. [12 points]

(e) Medicaid reimburses providers below-market rates, and as a consequence, not all U.S. doctors accept new Medicaid patients, and Medicaid patients often have to spend more time

searching for doctors than if they had private insurance. Provide an economic rationale for low provider reimbursement rates, instead of other cost-saving policies, such as increasing copayments. [5 points]

(f) Unlike in the TANF program, the U.S. government does not pursue child-support claims against the "deadbeat dads" of children raised in single-mother households on Medicaid. Should it? Discuss at least one economic argument in favor of it and one argument against it. [5 points]

4 We Were Never Retired in Eastasia [55 points]

The government of Eastasia wants your help in designing a new old-age pension system. In Eastasia, citizens live for two periods but can only work in their first period of life. All citizens have the following utility function:

$$u(c_1, c_2, h) = \sqrt{c_1} + \beta\sqrt{c_2} - \frac{h^2}{2},$$

where c_1 and c_2 are respectively consumption in the first and second period, h is labor hours, and the discount factor is $\beta < 1$. Workers in Eastasia also have access to a savings account that pays a per-period interest rate r. Assume that labor demand in Eastasia is infinitely elastic at a wage w.

(a) Suppose for now that there is no pension system and no taxes. Write down the citizen's optimization problem and intertemporal budget constraint. Find the first order conditions for c_1, c_2, and h in terms of a Lagrangian multiplier λ and other parameters. [6 points]

(b) Let $\beta = 0.8$ and $r = 0.10$. What is the equilibrium savings rate s^*? (*Hint:* The savings rate is defined as savings as a fraction of total compensation. You can use your results above for c_1 and h to obtain a savings rate which does not contain λ.) [5 points]

Under the Eastasian government's proposal, each citizen will get a new special savings account, into which their employer must deposit on their behalf $\$\tau$ for every \$1 in wage income the citizen is paid. Citizens may also keep their private savings accounts, but they cannot add to or subtract from their special accounts until the second period.

(c) If Eastasian citizens were to save nothing on their own, what is the employer contribution rate τ that would achieve a total savings rate s^*? (*Hint*: Remember that a citizen who earns an hourly wage w receives total hourly compensation, including the employer contribution, of $(1 + \tau)w$.) [3 points]

(d) Suppose the government chooses $\tau = 0.3$. Find, in the new equilibrium, the total savings rate and private savings rate. Discuss intuitively. [6 points]

(e) How does the hourly wage change when the new savings account is introduced? How do hours change? Explain intuitively how these two results are compatible with an upward-sloping labor supply curve. [5 points]

(f) How do wages and hours respond to increases in the employer contribution rate τ when $\tau > s^*/(1 - s^*)$? Is there still "full shifting" of the employer contribution? Explain, and discuss intuitively how your answer differs from part (d). [8 points]

(g) Now suppose that aggregate labor demand is not infinitely elastic. Discuss how wages respond to increases in τ, both when $\tau < s^*/(1-s^*)$ and when $\tau > s^*/(1-s^*)$. Is there still "full shifting" of the employer contribution? [8 points]

(h) Explain how the following features of the actual U.S. Social Security system affect the extent of shifting of the payroll tax, relative to Eastasia's system [3 points each]:

(i) The PIA is a progressive function of the AIME.

(ii) The typical retirement account is less heavily invested in lower-return assets, such as U.S. Treasury bonds, than the Social Security Trust Fund.

(i) Discuss intuitively whether there would be more or less shifting of the employer contribution in the following cases. Assume labor demand is not infinitely elastic. [4 points each]

(i) Some Eastasian workers have self-control problems when it comes to saving (and are aware of their self-control problem).

(ii) Some Eastasian workers are precautionary savers, because they face the risk of an expensive health emergency during the first period.

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