**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

EC 741 **Exam II** Fall 2023

R. Congleton **Graduate Public Economics I** WVU

This exam is comprehensive but focuses mainly on ideas and models developed in since the midterm exam. Answer each question a clearly and precisely as possible. The answers should be typed (ideally in word) and the exam should be submitted to me via email by Tuesday November 28th at 1:00. They should have the title *EC741\_EX2\_lastname\_firstname* and be sent to me at [roger.congleton@mail.wvu.edu](mailto:roger.congleton@mail.wvu.edu). With a bit of luck, I’ll have the exams graded by class time on Thursday November 30, and I’ll return them just before class, and discuss them in class and talk a bit more about your final papers that day.

Nearly all of the answers can be found in the web notes or in class notes (or both), but use your own words to describe the ideas and results that you’ve obtained. The work submitted should be your own independent answers. No internet sources, chatbots, or colleagues can be consulted—although notes and readings from class can be used. Show all of the math used to derive mathematical results.

1. Basic Concepts and Tools

* (5 points each) Identify and/or define the following terms or scholars. (In most cases, 2-3 precise sentences will suffice.)

a. Lindahl tax

b. Oates’ Decentralization Theorem

c. Condorcet Jury Theorem

d. Rent Seeking Loss

e. Flypaper Effect of Intergovernmental Grants

* (5 points) It is sometimes claimed that firms and their employees "equally share" the social security tax, because by law half of the money is deducted from employee salaries and the other half is paid by the firm.

1. Use the geometric tools developed in the first part of the class to analyze the theoretical distribution of the tax burden of the social security tax. Briefly discuss how common an equally shared distribution of the tax burden would tend to be? (Label all important details in your diagrams.)
2. Is there any case in which the distribution of the tax burden for social security is shared equally? Illustrate such a case.
3. Models of the Political Economy of Public Policy

* (25 points) Suppose that a tax-financed pension program similar to social security is a major policy issue in the election year of interest. Suppose that voters are of just two types: working and retired persons. An earmarked proportional tax on income is to be used to fund the program. And for simplicity, assume that the same pension will be received by each retired person. There are N workers and M retirees, with N> M. If we ignore many other considerations, the utility of an individual, i, in period 1 while working can be written as U1i=ui(C) where all after-tax income is used for consumption, C1 = (1-t)Yi(t) and the utility of the same individual in period 2 while retired as U2i = ui(C) with C=S+G, with S being a pension from his or her period of employment and G being the tax-financed pension. The tax-financed pension amount can be written as G= (M/N)tYave where Yave is the average income of a person while working. Lifetime utility is Ui = U1i + U2i/[1/(1+ri)] where ri is the individual’s intertemporal rate of substitution across the two period of life.

1. Write down the median voter’s optimization problem, after substituting for the various definitions and constraints. Assume that individualized variables of the median voter are all at the median of their overall distributions. (Hint: your equation should include just one control variable, either G or t, after all the substitutions are done, but several choice setting parameters.)
2. Characterized the median voter’s ideal tax-financed pension program, then use the implicit function theorem to characterize his or her “demand” function for program benefits.
3. How would changes in the subjective rate of discount affect the extent of the benefit demanded by the median voter? (Do this either or both mathematically and verbally.)

* (15 points) Write down a symmetric rent-seeking contest between 3 persons or groups that compete for a prize (such as a regulatory privilege or tax break) in a contest with a Tullock contest success function (e.g. a lottery-based game). [Hint: this is most easily done using a general N person contest and then characterizing the 3 person game as a special case.]

1. Characterize the ideal investment in this game by a typical individual participant in the contest for rents.
2. Characterize the Nash equilibrium total investment in this contest by all three players.
3. Determine the extent to which potential rents are dissipated by competition for this prize.
4. Constitutional Political Economy (*Answer just 2 of the following 3 questions*.)

* (15 points) We reviewed two theories of the origin of government in class: Olson’s extractive state model and Buchanan’s social contract–based model.

1. (10 pts) Discuss (or model) the differences in those models and in the sorts of public policies that one would expect from these two types of governments. (For convenience assume that there is a single ruler in the Olson state and democratic government with outcomes determined by the median voter in the Buchanan state.)
2. (5 pts) Explain why persons that create a productive state via social contract might agree to use majority rule for ordinary decisions but insist on super majority or consensus rules for major decisions such as revisions to the social contract (constitutional amendments).

* (15 points) It can be argued that constitutional designs have significant effects on the policies adopted by a government. Institutions are not primary drivers, but have secondary effects that may significantly affect the public policies adopted in a given country operating under a particular constitution.

1. (10 pts) Briefly discuss the electoral and policy differences between proportional representation (at large) and first past the post (single member districts) electoral systems. Assume that there are no other differences among voters.
2. (5 pts) Speculate about why Western democracies have tended to outperform most authoritarian regimes in both the short and long run for the past century.

* (15 points) Suppose that there are two regional governments in a given country. Both regional governments can invest in a local public good that improves the welfare of their residents. However, there are spillovers associated with their investment decisions. When region 1 provides the public good, region 2 bears some spillover costs, and vice-versa. More precisely, let be the local public good levels in region 1 be G1 and that in region 2 be and G2. Their respective welfare levels (or utility levels of their median voters) are assumed to be:

W1 = 2 (a G10.5 ) – c(G1 + .1G2)

W2 = 2 (b G20.5 ) – c(G2 +.2G1) where a>0 and c>0.

1. (5 pts) Characterize the Nash equilibrium levels of G1 and G2 when public investment decisions are taken simultaneously by welfare maximizing governments. Characterize the equilibrium welfare level in each region at the equilibrium.
2. (5 pts) Suppose that public investment decisions are centralized and the central government, by law, has to provide the service at a uniform level. What level of G maximizes the sum of the two region’s welfare? (Characterize this mathematically and briefly discuss your result.)
3. (5 pts) Finally, discuss reasons why the outcome associated with centralization may fail to maximize aggregate welfare.