University of Toronto
Economics 336 – Public Economics

Final examination
December 2015

You must not refer to books, computers, or any other aids. Pocket calculators and other aids are NOT permitted. You have 3 hours.

Part A. Answer SIX questions from this part. Keep your answers brief. (12 points each.)

1. Between 1975 and 2000, the incomes of the top one percent of the Canadian population rose from approximately 8% to approximately 14% of total income. By reference to the arguments in Saez and Veall (2005), discuss the economic factors that have led to this rise. What evidence is there to support your preferred explanation?

2. Define the *elasticity of taxable income (ETI)*. Explain how researchers can use *difference-in-difference estimation* to estimate the ETI from tax reforms. Discuss the work of Feldstein (1995) in your answer: Describe the tax reform studied and the conclusions drawn by Feldstein. What other factors, not considered by Feldstein, might have caused him to overestimate the ETI?

3. Define a *cap-and-trade system* for regulating greenhouse gas emissions, and explain why it is likely to be more efficient than a system of industry-specific limits on emissions. Use graphs or algebraic arguments to justify your answer.

4. State the *Samuelson conditions* for Pareto efficiency in the provision of public goods. Suppose there is one private good X and one public good G, and two identifiable types of citizens: type L citizens have utility functions

$$U_L(x_L, G) = \log x_L + \log G$$

   Type H citizens have utility functions

$$U_H(x_H, G) = \log x_H + 2\log G$$

   How does the level of public goods provision implied by the Samuelson conditions depend on the government's desire to redistribute from type L (low demand) to type H (high demand) citizens? Provide an economic intuition for your answer.

5. Define a *Lindahl equilibrium*. The City of Toronto is planning a new public park, but different citizens have different demand curves for park services. Explain how the government could set tax shares for the park in Lindahl equilibrium to determine the size of the new park. Is this outcome Pareto efficient? Is it Pareto superior to not building the park at all?

6. Define a *Condorcet winner*. Suppose there are 3 voters $(1,2,3)$ with preferences over 4 alternatives (a,b,c,d) given by $a \succ b \succ c \succ d$ for 1, $b \succ d \succ c \succ a$ for 2, and $c \succ d \succ a \succ b$ for 3 (where $\succ$ means "is preferred to"). Does a Condorcet winner exist in this case? If so, what is it? If not, why not?

Exam continues overleaf...

7. Define a *median voter equilibrium*. Under what assumptions on preferences does such an equilibrium exist? Do real-world democracies behave in ways consistent with this model? Discuss evidence presented in the paper by Mulligan et al. (2004), and other research discussed in class.

Part B. You MUST answer this question. (28 points.)

8. (a) One hundred commuters in a suburban town choose between travelling by train or by car. Travel time via train is 20 minutes. If N commuters choose to drive, then travel time via car is

$$T(N) = 10 + \frac{1}{4}N$$

in minutes. (That is, driving is faster when traffic is light, but the road is congestible.) Suppose that commuters choose their mode of travel to minimize their own travel time. What is the *unregulated equilibrium* number of drivers?

(b) Calculate the number of drivers that minimizes the total travel time of all 100 commuters, i.e.

$$TT(N) = \left(10 + \frac{1}{4}N\right)N + 20(100 - N)$$

Explain why the two answers differ.

(c) Find an optimal Pigouvian tax on driving (i.e. a highway toll) that decentralizes the optimal solution, assuming that commuters value their time at $1 per minute. Does this solution constitute a *Pareto improvement* over the unregulated equilibrium of part (a), or are some people worse off? Justify your answer.