University of Toronto
Economics 336 – Public Economics

Midterm examination
March 1, 2011

Part A. Answer THREE questions in this part. (20 points each.)

1. (a) State the *Ricardian equivalence hypothesis* about the impact of government deficits on investment and savings in the economy and give an intuition for the idea. State *two key assumptions* necessary for Ricardian equivalence to hold, and discuss their empirical relevance.

   (b) In 2010, the US government temporarily reduced income taxes on the richest 5 per cent of taxpayers in order to increase consumer spending. Discuss how this measure will affect consumption and private-sector investment.

2. (a) Summarize the economic theory of voluntary private contributions to public goods. Explain why government contributions should "crowd out" private contributions dollar-for-dollar.

   (b) Suppose that government subsidized private contributions to the public goods (e.g. through a tax credit for donations). Would this lead to total (public plus private) contributions that are higher, lower, or the same as without the subsidy?

3. (a) Explain the *Condorcet paradox* or voting cycle. Give two examples of voter preferences over a set of alternatives, one in which a voting cycle occurs, and the other in which it does not.

   (b) Under current law, health care in Canada is financed by progressive taxes, and no person may purchase health care privately. Assume that government health spending is determined through a process of majority voting. If people were allowed to purchase health care privately, would a majority voting equilibrium exist? If so, would the level of health spending be higher or lower than when private purchases are banned? Justify your answer.

4. There are three mutually exclusive social alternatives (A, B, C) and 11 voters each of whom has preference rankings as follows:

voter type	1	2	3
first choice	A	B	C
second choice	B	A	A
third choice	C	C	B
number of voters	2	5	4

   (a) Define the *Borda Count* procedure for choosing a winner. Which alternative wins under the Borda Count? Would any voter have an incentive to vote strategically under Borda Count in this example?

(b) Define the *Alternative Vote* procedure for choosing a winner. Which alternative wins under the Alternative Vote? Would any voter have an incentive to vote strategically under Alternative Vote in this example?

Part B. Answer both questions in this part. (20 points each.)

5. Saif and Hannibal have preferences over private consumption x_i and a public good G given by

$$u_S(x_S, G) = x_S^{1/3} G^{2/3}$$
$$u_H(x_H, G) = x_H^{1/2} G^{1/2}$$

Write down the *Samuelson conditions* for Pareto efficiency in this economy. Which of the following allocations are Pareto efficient, and which are inefficient?

(a) $(x_A, x_B, G) = (5, 30, 65)$ (b) $(x_A, x_B, G) = (10, 35, 55)$
(c) $(x_A, x_B, G) = (20, 10, 60)$ (d) $(x_A, x_B, G) = (30, 5, 65)$
(e) $(x_A, x_B, G) = (33\frac{1}{3}, 0, 66\frac{2}{3})$

(2 points for each correct answer [YOU SHOULD GIVE AN ANSWER FOR ALL FIVE!], minus one-half point for each incorrect answer, and up to 10 points for the Samuelson conditions and showing your work.)

6. A steel firm produces smoke as a byproduct of production, and smokes production costs of a neighbouring laundry. The cost functions of the two firms are

$$C_s(y_s) = \frac{1}{2} y_s^2$$
$$C_l(y_l, y_s) = \frac{1}{2} y_l^2 + \frac{1}{3} y_s y_l$$

where y_s is steel output and y_l is laundry output.

Assume that both firms sell their output in a competitive market for a price of one. Calculate the level of steel output $\hat{y}_s$ that maximizes the profit of the steel firm; the level of steel output y_s^* that maximizes the joint profits of steel and laundry firms; and the Pigouvian tax on steel output t^* that would cause a private steel firm to choose the efficient output y_s^* as its profit maximizing output. They are (choose one only):

(a) $(\hat{y}_s, y_s^*, t^*) = (1, 0, 1))$ (b) $(\hat{y}_s, y_s^*, t^*) = (1, 1/3, 2/3)$
(c) $(\hat{y}_s, y_s^*, t^*) = (1, 1, 0)$ (d) $(\hat{y}_s, y_s^*, t^*) = (1, 3/4, 1/4)$
(e) $(\hat{y}_s, y_s^*, t^*) = (1, 1/2, 1/2)$

(10 points for the correct answer, and up to 10 points for the definition of Pigouvian tax and showing your work.)