University of Toronto
Economics 336 – Public Economics

Midterm examination
November 19, 2009

Answer FIVE of the following questions.

1. Adnan, Biff, and Chen each value police protection differently. Adnan's demand for the public good is $Q_A(P) = 55 - 5P$ while Biff's is $Q_B(P) = 80 - 4P$ and Chen's is $Q_C(P) = 100 - 10P$. If the marginal cost of police protection is $c = 13.5$, what is the efficient level of public goods provision? Under Lindahl pricing, what share of the tax burden would each of the three people pay?

Since the inverse demands sum to $\sum W_i(G) = 41 - .55G$, the optimum is $G^* = 50$ and the Lindahl prices are $(t_a, t_B, t_C) = (1, 7.5, 5)$.

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2. Define a *Condorcet winner*. Suppose that there are four social alternatives A,B,C,D and three voters, Adam, Betty and Carlos with preference rankings given by

ranking	Adam	Betty	Carlos
1st	A	D	C
2nd	B	C	B
3rd	D	A	D
4th	C	B	A

Does a Condorcet winner exist in this case and, if so, what is it? Justify your answer.

A Condorcet winner is asingle alternative that beats (gets at least 2 votes against) all others in pairwise voting. There is no Condorcet winner because A beats B beats D beats A (a cycle), and D beats C. (Part marks for showing a cycle without showing absence of a Condorcet winner.)

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3. Define a *pure public good*. Assuming that government has access to lump-sum taxes and transfers among citizens, write down an equation defining levels of public goods provision that are Pareto efficient, and explain your answer with graphs or intuitive economic reasoning.

A pure public good is non-rival: consumption by one citizen does not reduce the amount available for others. A pure public good is also non-excludable: it is not possible to exclude citizens from consuming the amount provided to all. The Samuelson condition is $\sum_i MRS_i = MRT$. The sum of marginal willingnesses to pay for additional units should equal the marginal cost.

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4. Describe in qualitative terms the tax base for the corporation income tax in Canada. Does this tax tend to discourage capital investment by corporations or not? Justify your answer while stating clearly your assumptions.

The tax base is

gross revenues – wages – materials – interest paid on debt – depreciation allowances

Therefore this tax does not discourage investment if for example: (i) investment is financed with debt and tax depreciation is equal to true economic depreciation; or (ii) the full amount of equity-financed investment can be expensed in the first year of acquisition (a cash flow tax). (Significant part marks to any answer that discusses the Stiglitz (1973) result that deductibility of interest payments can lead to neutrality for investment, even if not all the details above are given correctly.)

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5. Jim has \$20,000 to divide between consumption today C_1 and saving towards future consumption C_2. Suppose that the pre-tax return on savings is 100% ($r = 1$), but Jim faces a 50% tax on interest income, so that each one dollar saved today in taxable form generates \$1.50 in future consumption. Furthermore, suppose that Jim's utility function is

$$U(C_1, C_2) = \log C_1 + \frac{C_2}{15000}$$

   (a) Calculate Jim's optimal level of savings $S = 20000 - C_1$ for this problem.

   (b) Now suppose that Jim can save up to \$5,000 in a Tax Free Savings Account that earns the pre-tax rate of interest, $r = 1$. Is Jim's total savings (in tax-free and taxable form combined) higher, lower, or the same as in part (a)? Give an economic intuition for your answer. (Hint: draw a graph of the budget constraints for parts (a) and (b), and compare the optimum points.)

(a) Jim will choose S to

$$\max \log(20000 - S) + \frac{1.5S}{15000}$$

so $S_0^* = 20000 - 10000 = 10000$.

(b) To get the formal answer to this part, note that if Jim invests the maximum in the TFSA it will be worth 10000 in the future period, so $C_2 = 10000 + 1.5(S - 5000) = 1.5S + 2500$. Therefore he solves

$$\max \log(20000 - S) + \frac{1.5S + 2500}{15000}$$

So $S^* = 10000$, the same as before.

A less formal but acceptable answer is to note that for this utility function there is no income effect on the optimal level of savings (or of C_1). Because Jim wants to save more than the TFSA limit, there is also no price effect of the program, so that savings is unchanged.

An answer that notes there is no price effect of TFSA because desired saving is higher than the limit – but which does not discuss the absence of an income effect on savings – gets partial marks.

6. State the *Tiebout hypothesis* regarding the benefits of decentralization of public goods provision to local governments. Discuss one problem that arises in the real world that is inconsistent with Tiebout's assumptions, which can make decentralization inefficient.

Tiebout hypothesis: when there are many local governments, each of which may offer different levels of public goods provision and different tax rates, individual voters "vote with their feet" and choose to reside in a community that offers their preferred level of public goods. In equilibrium, the allocation is Pareto efficient.

Key assumptions:

(a) There are enough communities that each preference type in the population can have its preferred level of the public good.

(b) There are no economies of scale in local public goods provision and no congestion costs, so that community size is irrelevant.

(c) No spillovers across communities (otherwise there will be too little of national public goods provided).

(d) Government is financed with head taxes rather than redistributive property or income taxes, so that there is no incentive for people to move to communities where other residents have higher incomes (otherwise communities will be mixed and public goods inefficient).

(e) No mobility costs and in particular people can move to a new community without changing jobs: income is indepoendent of location (otherwise the problems of the Boadway Flatters model arise).
