

University of Toronto
Economics 336 – Public Economics

Final examination
December 14, 2009

1. Excess burden: The amount of lump-sum income a taxpayer would pay, in excess of the revenue actually collected, in order not to have to pay a tax. (Or the amount of lump-sum income that is equivalent to the tax, less revenue collected.) The excess burden of an excise tax can be negative, if the tax causes an increase in the compensated demand for a (complementary good) that is also taxed. (The “rum/gin” example.) (Minimal penalty for students who produce the above logic but omit the word “compensated”.)
2. For those saving at or above the limit, an increase in the limit creates only an income effect, not a price effect. For “typical” preferences we can show that private saving rises in this case, but by less than the value of the new RRSP tax deduction, so national saving must fall. For those saving below the limit, an increase in the limit has no effect.
3. The UCC is the minimal pre-tax return that a unit of capital must earn in order for the investment to be profitable on an after-tax basis. Based on the (simplified) model presented in class, the formula is

$$UCC = \frac{(1 - \lambda\tau)r + \delta - \tau z}{1 - \tau}(1 - \alpha)$$

where λ is proportion of capital debt financed, z is the CCA rate, and α is the investment tax credit rate. Under the cash flow tax, $\lambda = z = 0$ and $\alpha = \tau$, so we have $UCC = r + \delta$ which is the same as no taxation of marginal investments. Therefore this change would reduce the UCC if and only if the current effective tax rate is positive.

4. A Condorcet winner is a level of spending that defeats all alternatives in a majority vote. A Condorcet winner may not exist with opt-out. But since l beats m (supported by L and H) and l beats h (supported by L and M), l is a Condorcet winner.
5. Suppose that travel by car is subject to time congestion costs but travel by train is not. Then each car commuter imposes a negative time externality on other car commuters which is not accounted for in the decision to use their cars. If some car commuters were forced to take the train instead of car, their own travel time would rise, but the total travel time of all commuters would fall. (It is not a Pareto improvement.)
6. There is no difference (except in government revenue).
7. Theory of cross-subsidization: if fees charged by natural monopoly are to cover fixed costs, and price discrimination is possible, then each consumer type should pay a markup over marginal cost that is inversely proportional to demand elasticity. Most plausibly, students’ demand is less elastic than others, since they are less likely to own cars. Therefore, no: the theory cannot justify a reduce fee for students.

Part B. Answer BOTH questions from this part. (17 points each.)

8. Since marginal cost is zero and there is excess capacity outside rush hour, it is optimal to set the fare then to $f_n = 0$. At rush hour, a fare of zero would result in excess demand, so fares should be used to ration trips among consumers (why use fares instead of queues, by the way?) If a “peak-load fare” of $f_r = w_r(K) = A - K$ is chosen, then supply equals demand at rush hour. For the last part of the question, observe that the net benefit to society of subway capacity K is

$$B(K) = \frac{1}{2}K^2 + (A_r - K - c)K + \frac{1}{2}A_n^2$$

(Draw the graph and use the Harberger triangle formula to verify this). Therefore the optimal capacity sets $B'(K^*) = 0$ or $K^* = A_r - c$, and the optimal fare at rushhour is $f_r = c$. Revenues are $R = cK^*$ which exactly cover the capital costs of the system.

9. Suppose the permit price is p . Since polluters will abate if the marginal cost is less than the permit price, the demand for permit is

$$100 - A_1 - A_2 = 120 + (10 - p) + (20 - p) = 150 - 2p$$

Since there are 70 permits supplied, the equilibrium price is $p^* = 40$, so $A_1^* = 30$ and $A_2^* = 20$.

(Part marks for anyone who understands that the MC curve can be used to construct the demand curve for permits. At least 12 points out of 20 for anyone who draws a clearly labelled graph of the two MC curves, with a price line and equilibrium abatement quantities labelled, even if the numbers associated with them are wrong.)