

14.41 Fall 2004 Mock Final—Solutions

T/F/U

1. False—the benefits of music education are no longer captured by the town that provides them; rather, residents of every town benefit from the education provided in each. Therefore it is no longer a “local” public good—it has positive externalities for other towns and will be underprovided by localities. The requirements of Tiebout are no longer satisfied.

2. Uncertain—first, if mothers are optimizing their children’s utility as well as their own, then they can already decide whether it is better to stay home or to increase consumption. The government should only intervene if it believes women are not optimizing their children’s utility. If we believe that families can optimize for themselves, then we do not want to distort their labor-leisure choice by taxing an input into work. However, to avoid a labor-leisure distortion it might be better, instead, to tax home child care instead of giving a subsidy to market child care, since that makes a broader base (better from a Haig-Simons perspective). In addition, if child-care subsidies are a good way to target redistribution to families that need it, it may be a good idea.

3. False—high-income families and low-income families differ in many ways, both in their reactions to the same economic phenomena and in the economic phenomena that affect them (for example, wages might be falling for low-skilled workers at the same time that they are rising for high-skilled workers). Therefore low-income families are a terrible control for high-income families, and this is not a valid natural experiment.

4. Uncertain—it depends how much employees value dental insurance. If they value it at as much or more than it costs the employer, then employment will not be distorted—it may even increase if there was a market failure previously (employees valued dental care at more than its cost, but because of adverse selection—all the people who need root canals going to the one employer who offers dental insurance—the insurance wasn’t offered). However, if employees value dental insurance at less than its cost, then there will be dead weight loss and employment will be distorted.

5. Uncertain—if every child who joins the program was previously uninsured, then surplus increases by \$5B. If, however, as is likely, at least some of those children have been moved from private insurance, then some of this money is just a transfer that has not increased surplus.

6. Uncertain—It is efficient to tax according to the “inverse elasticity rule,” which says that the more inelastic is the demand for a good, the higher should be its tax. But equity matters also—purchases of penicillin probably make up a larger portion of the budgets of low-income, sick people, and so this tax would be regressive. In addition, if demand is not *perfectly* inelastic, it means that some people will go without penicillin when its after-tax price increases. This may cause the spread of disease—there are positive externalities to taking penicillin when ill, so we may want to *subsidize* penicillin instead of taxing it.

Short essays

1. The effects of this policy are ambiguous.

First, it's not clear whether decreasing the tax on interest income will increase or decrease private saving, since it has offsetting income and substitution effects. While it's possible that, as politicians generally assume, the substitution effect dominates and people will save more because consumption in the future is now cheaper, it could go the other way. For example, if people are target savers—who just have a certain total they want to accumulate, then the income effect will completely dominate and they will now just save less because it requires less saving to hit the target.

If the tax-offset is done perfectly, so that the increase in labor income tax perfectly cancels out the decrease in interest tax, then there will be no effect on government saving. Thus the effect on national saving will just be equal to whatever is the effect on private saving.

A static calculation of the necessary increase in the labor income tax will probably understate the increase needed. When labor taxes increase, the amount of taxable labor income falls, so that a higher rate is needed on the remaining base in order to achieve the necessary revenue. Thus dynamic estimates would typically be larger (although some would be smaller, if they assume that the income effect of the tax increase is larger than the substitution effect).

2.

- a) Kennedy's plan would probably dramatically increase the quantity of drugs purchased, since people will now face a zero marginal price of drug purchases. Health outcomes would probably improve for those who currently are underusing drugs because they can't afford them, but for many people who already could afford necessary drugs, this will be "flat of the curve" spending that won't improve health. In addition, this plan will encourage many employers to drop their existing drug coverage (crowdout), so the plan will end up being very expensive for the number of currently uninsured people it helps. While for the currently uninsured this will be a valuable program, for many people it will simply be a cash windfall (since they can drop their private drug coverage and get free coverage from the government).
- b) McCain's plan would also dramatically increase the quantity of drugs purchased, although not by quite as much—since many insurance plans will still require some sort of copay that will mean people face a positive marginal price of drug purchase. Again, it will improve health outcomes for those who currently are underusing drugs because they can't afford them, but for many people who already could afford necessary drugs, this will be "flat of the curve" spending that won't improve health. In addition, this plan again will encourage many employers to drop their existing drug coverage (crowdout), so the plan will end up being very expensive for the number of currently uninsured people it helps. While for the currently uninsured this will be a valuable program, for many people it will simply be a cash windfall—giving them a tax credit to buy insurance they would have bought anyway. In

addition, the sickest people will find that insurers will not insure them for the price of the tax credit, and so the neediest may not be helped by the plan.

Long problems

1.

a) In the short run, the incidence of the tax will be totally on hotels.

Demand for hotels in Boston is somewhat inelastic, but supply (in the short run) is totally inelastic. Thus, the price will not change when the tax on hotels is imposed.

(b) In the long run, the supply of hotels is free to adjust. In the limit, if supply is perfectly elastic, then hotels will leave Boston for the suburbs, until the price received for a hotel visit is the same as elsewhere. That is, the tables are turned - since demand is somewhat inelastic, if supply is perfectly elastic, then hotel visitors will bear the full tax.

(c) With demand perfectly elastic, hotel visitors won't be willing to bear any of the tax; they will just stay in the suburbs. The owners of hotels won't be willing to bear it either; they can just move to the suburbs. This is a strange case, because both supply and demand are perfectly elastic. The result, in long run equilibrium, will be that there will be no hotels/motels in Boston, and the tax will collect no revenues. This is an example of a completely distortionary tax - the excess burden is infinitely larger than the revenues collected.

(d) If land was imperfectly substitutable, then the landowners would bear some of the tax as hotels/motels leave the Boston area. That is, as some hotels started to leave (as in (b)), the owners of the land would lower the rent, since otherwise the land goes to waste. Thus, some of the tax is borne in the form of lower rents on hotel land. There would be more hotels in Boston in the long run. To see why, note that, in (b), hotels had to leave until the visitors paid the full tax through higher prices. Now, with land bearing some of the tax, visitors will have to bear less, so the price in equilibrium will be lower, meaning more hotels will be in Boston. If land were completely imperfectly substitutable, then landowners would bear the full tax; land would be the completely inelastic factor.

2.

a) The marginal valuation of street cleaning is $(Y/10)-S$. For professors, this expression equals $20-S$; for students, this expression= $10-S$. The marginal cost is 5 for both professors and students.

b) Professors want $20-S=5$, so that street cleaning $S=15$.
Students want $10-S=5$, so that street cleaning $S=5$.

c) Cambridge provides $S=15$ and the Cambridge students are unhappy with the outcome. Somerville provides $S=5$ and the Somerville professors are unhappy with the outcome.

- d) The Somerville professors will move to Cambridge and the Cambridge students will move to Somerville. In equilibrium, there will be 75 professors in Cambridge and 75 students in Somerville. Everyone is satisfied and the provision of street cleaning is efficient because everyone in each town values street cleaning equally.

Now, Cambridge will provide the quantity of street cleaning that can be paid for with its revenue: $(50 \cdot 75) + (25 \cdot 25) = 4375 \rightarrow S = 11.67$ in Cambridge. Somerville will collect revenue equal to $(25 \cdot 75) + (50 \cdot 25) = 3125 \rightarrow S = 8.33$ in Somerville. Now, students will all want to move to Cambridge, because they can get more street cleaning in Cambridge *without paying higher taxes*. The state regulation breaks down the Tiebout sorting mechanism.

3)

- a) Note that maximizing the natural log of utility will yield the same result as maximizing utility (because the natural log of utility is a monotonic transformation of utility).

In the no food stamp world, the equilibrium demands for food and other goods come from solving the lagrangian

$$L = 1/3 \ln(F_i) + 2/3 \ln(X_i) - \lambda(F_i + X_i - Y).$$

In this case, $Y = \$300$. As this problem is standard Cobb-Douglas, the demands are easily shown to be

$$F_i^* = \$300/3 \text{ and } X_i^* = (2/3) \cdot \$300,$$

so food consumption would be \$100 and consumption of other goods is \$200.

- b) People with incomes of \$300 get \$204 in food stamps; they still have \$300 to allocate between food and other goods, except now the first \$204 in food consumption is "free" and therefore doesn't enter the budget set. Where F_i corresponds to "extra" food consumption, above and beyond the \$204 in food stamps, solve the lagrangian

$$L = 1/3 \ln(F_i + 204) + 2/3 \ln(X_i) - \lambda(F_i + X_i - Y).$$

The first-order conditions reduce to

$$2(F_i + 204) = 300 - F_i$$

so that such people would want to consume negative amounts of extra consumption; the implicit nonnegativity constraint binds. If $F_i^* = 0$, then X_i^* equals \$300. Note the "crowd-out" result: it costs the government \$204 to increase food consumption by only \$104 -- the other \$100 goes to consumption of other goods, an income effect.

- c) The standard conditional nonmatching grant diagram is the appropriate diagram.
- d) The diagram above suggests the possibility of a loss in economic efficiency due to constraining outcomes to be off of the dotted part of the budget line; the question of inefficiency reduces to whether the constraint is binding -- i.e., whether agents would

optimally settle on the dotted part of the budget set if they instead received a lump-sum grant equal to \$204. Indeed, the constraint is binding because with an income of \$504 to allocate optimally, $F_i^* = \$168$ and $X_i^* = \$336$; this outcome is intuitive, as it would be highly coincidental for the kink point to be the optimal outcome.

It costs the government \$204 to provide the (204,300) consumption bundle, which generates log utility of 5.575. The efficiency question reflects the fact that it would cost the government less money to achieve the same level of utility if it gave cash grants (i.e., nonconditional nonmatching grants that do not constrain the budget set). Assume a cash grant of X above the \$300 income; the demands become $F_i^* = (300+X)/3$ and $X_i^* = (300+X)*(2/3)$. Solving

$$(1/3)\ln((300+X)/3) + (2/3)\ln((300+X)*(2/3)) = 5.575.$$

for X reveals that the same level of utility could be obtained at a cost of only \$198.45, so that the in-kind benefits cause an inefficiency valued at (\$204-\$198.45) or \$5.55.

e/a) For $Y = \$900$, $F_i^* = \$900/3 = \300 and $X_i^* = (2/3)*\$900$ or \$600.

e/b) People with incomes of \$900 get only \$24 in food stamps and still may allocate the \$900 between food and other goods. Solving a lagrangian analogous to the one above

$$L = 1/3\ln(F_i + 24) + 2/3\ln(X_i) - \lambda(F_i + X_i - Y),$$

reveals that $F_i^* = \$284$, making total food consumption \$308, and $X_i^* = \$616$. There is still "crowd-out": \$16 of the \$24 goes for consumption of other goods.

e/c-d) Another conditional nonmatching grant, but this time the constraint against using the dotted part of the budget set is not binding. A \$924 income would induce the same consumption bundle as the in-kind transfers, so that there is no loss in economic efficiency from using the in-kind transfer rather than the lump-sum, cash transfer.