

14.41 Public Economics, 2002
Problem Set #4 Solutions

1)

a) Each worker must be paid his marginal product, \$200, because the labor market is perfectly competitive. Specifically, the combined cost of wages and EPHI to the firm must be \$200 per worker. Because firms cannot offer employee specific contracts, the labor market will have two types of firms – one which offers EPHI and the other which does not. The firms which offer EPHI will pay a wage of \$100 and provide EPHI (at a cost of \$100). The other firms will not offer EPHI and pay a wage of \$200. The worker utilities are as follows :

	EPHI offered	EPHI not offered
U_i	150	200
U_k	210	200
U_l	250	200

As the tables makes clear, worker i will be employed by a firm which does not offer EPHI. If he initially went to work for a firm which offered EPHI, he would immediately be lured away by a firm offering no EPHI and higher wages. Workers k and l will be employed by a firm offering EPHI. The fact that the labor market is perfectly competitive and that workers place different values on EPHI ensures both types of firms will exist. The compensating differential is \$100. Workers who receive EPHI are paid \$100 less than those who do not. Worker k is earning a rent of 10 and worker l is earning a rent of 50. The perfectly competitive labor market suggests the workers are able to permanently capture these rents. If a firm attempts to seize any of the rent, another firm will bid the worker away.

b) If a firm of type 1 offers EPHI, it will be forced to pay a wage of zero. All three workers above receive higher utility by taking a job which offers no EPHI and a wage of \$200. Firm's of type 1 cannot attract workers if they offer EPHI and will therefore always offer no EPHI and a wage of \$200. Firms of type 2, as shown in part a, can either offer EPHI or not. If they offer, they will attract workers k and l. If they do not offer EPHI, they may attract worker i. Workers k and l will be employed by a firm of type 2 which offers EPHI and pays a wage of \$100. Worker i may be employed by a firm of type 1 or a firm of type 2 that does not offer EPHI. In either case, he is paid a wage of \$200.

c) The workers utility are as follows:

	Type 1 : does not offer EPHI	Type 1 : EPHI offered	Type 2 : does not offer EPHI	Type 2 : EPHI offered
U_i	230	80	200	150
U_k	230	140	200	210
U_l	230	190	200	250

Worker i continues to work at a firm with no EPHI. Worker k now switches to work for a firm which does not offer EPHI, but pays a higher wage of \$230. Worker l continues to work for a type 2 firm which offers EPHI. He continues to work at a type 2 firm despite the fact that his marginal productivity is higher at a type 1 firm. He is suffering from job-lock. As in part b, type 1 firms will never offer EPHI. Type 2 firms will always offer EPHI – otherwise they fail to attract any workers.

d) A difference-in-difference (DD) estimator is well suited to studying job-lock in this case. As was done in recitation in the context of Krueger's worker's comp paper, set up a table to display the DD estimator :

	After	Before	Difference
Treatment	D_A^T	D_B^T	$D_A^T - D_B^T$
Control	D_A^C	D_B^C	$D_A^C - D_B^C$
	$D_A^T - D_A^C$	$D_B^T - D_B^C$	$(D_A^T - D_B^T) - (D_A^C - D_B^C)$

Here the treatment is the state with health insurance policy change which allows workers to continue health insurance coverage after leaving a job. The control is the state without a policy change. The before period is the first year of the data, in which neither state had a policy change. The after period is second year of the data, in which the treatment state had the policy change. D denotes the percent of workers who changed jobs in the relevant cell. For example, D_A^T is the percent of workers who changed jobs in the treatment state in the after (or post) period. $(D_A^T - D_B^T) - (D_A^C - D_B^C)$ is the DD estimate of job-lock. It is the increase in job mobility that resulted from the policy change. It is unaffected by any change in job mobility between the two years common to both states and unrelated to the policy change. There are some potential problems with this estimator. Both the control and treatment states must be comparable in their job transition behavior. For instance, if the control state has a different trend in job transition behavior, the DD estimator is invalid. Another concern is *legislative endogeneity*. It is possible that the state with the policy change instituted the change because there was some change in the states economy which did not affect the control state (and which therefore explains why the control state did not have a similar policy change). In this case, the DD estimate is also invalid.

2)

a) Pros:

- Adverse selection in prescription drug insurance market may mean that generous drug coverage is unavailable or too expensive for sick people to afford.
- There may be positive financial externalities from drug insurance i.e. if Medicare recipients can afford to take their prescriptions, they may be able to control chronic conditions (i.e. high blood pressure). If they don't take their prescriptions, on the other hand, they might end up needing expensive procedures that Medicare must pay for.
- There may also be an equity argument, since prescription drugs are expensive. We don't want rich people to be the only ones who can afford them.

Cons:

- There may be negative financial externalities i.e. if drug coverage leads people to go the doctor's office more frequently in order to get prescriptions.
- Moral hazard: people with prescription drug coverage may end up taking more drugs than is optimal, because they don't bear the marginal costs.
- People won't have an incentive to "shop" for their drugs i.e. you will always want the brand-name drugs, rather than the generic versions, since you aren't paying the bill.

b) Senator Kennedy's proposal:

- Quantity of drugs? Since there aren't any copayments, people will overconsume drugs, because they don't bear any of the marginal cost.
- Health outcomes? This will vary among people, depending on where they are along "the curve". People who are on the "flat of the curve" (people who already have drug coverage, but probably pay copayments and premiums under the current system) will have small changes in their outcomes. People who don't already have drug coverage, especially sick people, will likely have improved health outcomes.
- Cost-effectiveness? This policy is likely to have very low bang-for-the-buck, because 56 % of elderly people who already have insurance will be given *more generous* insurance by Senator Kennedy. The money being spent on 56% of the people would be primarily wasted.

c) McCain's plan takes the competitive approach. However, it doesn't deal with the adverse selection problem. The private health care plans would try to attract the healthiest Medicare beneficiaries; the unhealthiest people (who might have the greatest need for prescription drug insurance) would be likely to stay on Medicare and not receive the drug benefit. The adverse selection issue is mitigated by the fact that everyone, including the sickest people, would have catastrophic coverage, in the sense that no one would spend more than \$6000 on drugs.

Furthermore, all low-income folks, whether sick or healthy, would have insurance.

- Quantity of drugs? Will be increased, especially among people who are poor or who are very sick (i.e. spend more than \$6000 per year on drugs).
- Health outcomes? Would likely find improved health among the low-income and the sick, since they are unlikely to be on the "flat of the curve". It seems likely, though, that the Medicare beneficiaries who switch to private plans with prescription drug coverage are already healthy and won't see much improvement in health outcomes.

- Cost effectiveness? Competition among private Medicare health plans is likely to decrease the cost of prescription drug coverage. However, as we discussed in class, Medicare vouchers may actually increase costs to the government, since the private plans will try to attract the healthiest people, who were previously costing Medicare much less than the average cost. This plan will likely cost a lot, but the plan does a better job than Senator Kennedy's of targeting people who are sick and poor.
- d) Daschle's plan: The \$25 monthly premium and the relatively high copayments mean that people who have access to private drug insurance (through a former employer, etc) might consider Medicare's drug coverage to be relatively unattractive.
- Quantity of drugs? Will be increased, especially among people who currently don't have access to drug coverage, poor people, and sick people (who currently have high out-of-pocket spending).
 - Health outcomes? Likely to be improved, because the plan targets people who currently don't have good access to drug insurance and, thus, may be under-consuming drugs. It is also likely to affect people who are not on "the flat of the curve"
 - Cost-effectiveness? Gore's plan is quite cost-effective, because the majority of the spending is on people who don't currently have access to drug insurance and may see significant improvements in their health when they gain access.
- e) Bush's plan: There are several problems with using tax credits

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

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

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

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

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.

- a. As in class, assume that a maximum endowment of time per year is 2000 hours. The budget set between leisure and consumption obtains by linking the 2000 hours point on the X-axis with \$40,000 in consumption on the Y-axis. Up to \$7140 of earnings, which corresponds to 357 hours of work (or 1643 hours of leisure), the wage rate is actually $1.167 \times \$20$, an increase in the slope of the budget set relative to the no-EITC world.

The subsidy for the middling wages does not affect the wage *rate*, relative to \$20, so that the slope of the budget set returns to the pre-EITC slope, but the budget set shifts out. (Note that over this range of the budget set, it's as if the worker receives a conditional nonmatching grant of \$1192.38 ($0.167 \times \7140) in consumption goods). \$11250 corresponds to 562.5 hours of work (1437.5 hours of leisure).

After 562.5 hours of work, you still get the \$1192.38 grant, but the slope of the budget set is reduced by the 11.9% wage tax. The EITC budget set rejoins the original budget set at 937.9 hours of leisure and then two are equal additional hours of work.

- b. The EITC has both income and substitution effects so that the net effect on labor supply is difficult to discern *ex ante*. Much can be inferred, however, from eyeballing likely changes in tangencies for various parts of the budget set. For example, for people who found more than 1643 hours of leisure in the pre-EITC world, the substitution effect probably dominates, so that a new tangency of an indifference curve with the new budget set obtains at less leisure. However, the folks who had originally between 1437.5 and 1643 hours of leisure face only an income effect, and assuming that leisure is a normal good, work hours will fall as leisure increases. Guys who might fall on the part of the EITC budget set that slopes back to the original budget set have the income effect that suggests less work and a substitution effect that creates an incentive *away* from working; these people will surely demand more leisure and work less. Obviously, beyond the point where the EITC budget set rejoins the original set, there is no effect on work incentives.

c.

- d. There are different effects at different income levels. At really low income levels (where we want to increase income), it appears that a positive substitution effect dominates the small negative income effect. Overall, having both programs seems a bit redundant.