14.41 Problem Set #3 Answer Key

1a) $E[U]= (1-\alpha)\ln(W+10)+ \alpha\ln(10)$

b) There is no moral hazard, so optimal insurance is full. This means the government will pay workers a benefit $B = W - \tau$ when they are unemployed and charge them τ when they are employed. To break even when paying α % of workers $W- \tau$, the government must tax the $(1-\alpha)$ % of workers who are employed αW, or a rate of α. Algebraically, the government must:

$$\text{Max } (1-\alpha)\ln(W+10 - \tau)+ \alpha\ln(10 + B) \qquad \text{s.t.} \qquad (1-\alpha)\,\tau = \alpha\, B$$

$$\rightarrow \max\ (1-\alpha)\ln[W+10 - \tau] + \alpha\ln[10 + \tau\,(1-\alpha)/\alpha\,]$$

$$\text{FOC: } (1-\alpha)/\,[W+10 - \tau] = (1-\alpha)/\,[10 + \tau\,(1-\alpha)/\alpha\,]$$

$$W+10 - \tau = 10 + \tau\,(1-\alpha)/\alpha$$

$$W - \tau = \tau\,(1-\alpha)/\alpha$$

$$\tau = \alpha W \qquad \rightarrow \qquad B=(1- \alpha)W$$

c) Since utility is concave, there are diminishing marginal returns to consumption, so consumption smoothing across the employed and unemployed increases average welfare.

d) $E[U]= (1-\alpha)\ln(W+10)+ \alpha\ln(kW+10)$

e) Now things are more complicated, because there is self-insurance being provided. The government must:

$$\text{Max } (1-\alpha)\ln(W+10 - \tau)+ \alpha\ln(10 + kW + B) \qquad \text{s.t.} \qquad (1-\alpha)\,\tau = \alpha\, B$$

$$\rightarrow \max\ (1-\alpha)\ln[W+10 - \tau] + \alpha\ln[10 +kW+ \tau\,(1-\alpha)/\alpha\,]$$

$$\text{FOC: } (1-\alpha)/\,[W+10 - \tau] = (1-\alpha)/\,[10 + kW+ \tau\,(1-\alpha)/\alpha\,]$$

$$W+10 - \tau = 10 + kW + \tau\,(1-\alpha)/\alpha$$

$$(1 - k)W - \tau = \tau\,(1-\alpha)/\alpha$$

$$\tau = \alpha(1 - k)W \qquad \rightarrow \qquad B=(1- \alpha)\,(1 - k)W$$

f) Optimal insurance is still to smooth perfectly. If the government continued taxing and providing benefits as in b), consumption would be *higher* in the unemployed state than in the employed state. Therefore the government insurance must reduce by the average amount of self-insurance in the economy, αkW.

While government insurance still increases social welfare, it is not as beneficial as it was in c), since there was some consumption-smoothing provided privately.

2) No, the fact that people who do not receive UI are unemployed for a shorter period of time does not prove that UI causes longer durations of unemployment. There are several differences between those who receive UI and those who don't:

- Only people who are laid off are eligible for UI, not those who are fired or quit;
- Of those who are eligible for UI, only 2/3 decide to take up benefits. One alternative explanation for the president's table is that people who know they can find another job easily don't bother to apply for UI. The key is that receiving UI is not a random experiment with a treatment and control group, so there could be other differences between the groups that account for the difference in outcomes.

Better evidence about the effect of UI on unemployment durations can be found in the work of economist Bruce Meyer. In one study of state law changes (a natural experiment where some people were affected by the law change and others weren't), he found that a 10% increase in benefits was associated with an 8% increase in durations. In another study where he looked at the probability of going back to work each week conditional on being unemployed for that amount of time (the hazard rate), he found that lots of people found jobs at 26 weeks, when their unemployment benefits were running out. Both these studies suggest that UI benefits do affect the duration of unemployment.

b. No, for at least two reasons:

- Longer durations of unemployment could lead to better job matches, which is a benefit to society. We do not want brain surgeons working at McDonald's just because it takes a little while to find a new brain surgeon position. Relatively generous benefits allow people to take the time they need to make a good job match. However, the Meyer study of hazard rates and evidence showing that people who are unemployed longer do not get higher wages suggests that this is not a very important consideration in reality.
- Perhaps there are two kinds of unemployed people: lazy rich people, who can get a job whenever they want, and poor hardworking people, who have a hard time finding a job. Then, while reducing UI would induce the lazy rich people to look harder for a new job, it would also hurt the consumption of the poor people who are already looking as hard as they can. We would have to weigh these implications to decide whether it was worth it to reduce the program's generosity.

ci) With individual perfect experience rating, firms don't pay any of the cost of layoffs, so we would expect more layoffs than under a policy of firm perfect experience rating, where firms pay the cost. (If firms are able to pass the cost of unemployment benefits through to the worker in the form of lower wages, then individuals may pay under both policies.) With individual perfect experience rating, we would expect unemployment durations to be shorter; since individuals have to pay back all the benefits they receive while unemployed, they stay unemployed only long enough to find a good job match.

cii) Individual perfect experience rating provides individuals with good incentives to find a job quickly, but does not provide them any insurance against becoming unemployed (they bear the full cost of the layoff). Firm perfect experience rating provides individuals with insurance against layoffs, but does not provide any insurance for firms (though it gives the firm the right incentives about whether to lay off a worker). As always with social insurance, there is a tradeoff between incentives and insurance because of moral hazard.

ciii) Either plan will decrease the level of risk-taking economic activity, since people or firms that must insure themselves will be more risk-averse. *If we think risk-taking economic activity is beneficial to society, then this is a drawback.*

3a) The rationale behind the first proposal would be that we could give higher benefits for injuries that are harder to fake—then we could make disabled people better off (which, after all, is the point of the program) without encouraging people to fake injuries for the higher benefit (since we would only give the higher benefit for injuries that are hard to fake.)

Think of the "lottery" of applying for DI as a faker—you have some probability p of getting approved even though you're not disabled, and a benefit B if you get approved. So the expected value of the lottery is pB, and the size of the expected value is how fakers decide whether it's "worth it" to quit work for 5 months. For injuries with a lower p, we can increase B without changing the expected value of the lottery.

The rationale behind the second proposal is, again, that fakers compare pB to the cost of quitting work for 5 months when they decide whether it's worth it to apply. So increasing the cost of applying, by extending the period they would have to go without work, would decrease the number of fakers.

3b) The drawback to the first program is that those who are truly injured with injuries that are hard to fake would have smaller benefits.

The drawback to the second approach is that the truly disabled people—who are the point of the program—would be hurt by having to wait, if they were credit constrained and had to decrease consumption even though they were going to get reimbursed (also, remember that the truly disabled also have some chance of getting rejected from the program).

3c) You would want to lower benefits for those whose injuries are easy to fake (e.g. back pain) relative to those whose injuries are difficult to fake (blindness, paraplegia).

4a) In a world without insurance, people consume 0, and have utility 0, when they do not work. Their utility maximization decision is therefore:

$$\max \{{}^{2}/_{3}*9*^{3/2} - ½ P^2, 0\}$$
$$\rightarrow \text{work if } {}^{2}/_{3}*9*^{3/2} - ½ P^2 < 0$$
$$\rightarrow \text{work if } P < 6$$

So those whose pain is an element of (6,…10), or 2.5% of the population, will not work, and the labor force participation rate is 97.5%.

4b) The social optimum occurs where the social marginal cost of working—in this case, the marginal decrease in utility due to pain when working—is equal to the social marginal benefit of working—in this case, the marginal increase in utility due to production/consumption from working. So it is socially inefficient for people to work if:

$$dU/dC \leq -dU/dP$$
$$9^{1/2} \geq P$$
$$P \geq 3$$

When P is 3 or higher, the marginal cost of working exceeds the marginal benefit, and social surplus shrinks.

4c) Now workers' utility maximization decision is:

$$\max \{{}^{2}/_{3}*9*^{3/2} - ½ P^2, {}^{2}/_{3}*7.5*^{3/2}\}$$
$$\rightarrow \text{work if } {}^{2}/_{3}*9*^{3/2} - ½ P^2 < {}^{2}/_{3}*7.5*^{3/2}$$
$$\rightarrow P < 2.93494$$

So when P is 3 or higher, they will not work.. Those whose pain is an element of (3,…,10), or 4% of the population, will not work, and the labor force participation rate is 96%. This increase in the "adverse event" is *efficient*: previously people worked even though the costs exceeded the benefits because they couldn't save to consume when injured (C=0 if not working). That inefficient behavior, due to credit constraints, has now been eliminated.

4d) Now workers' utility maximization decision is:

$$\max \{{}^{2}/_{3}*9*^{3/2} - ½ P^2, {}^{2}/_{3}*8.5*^{3/2}\}$$
$$\rightarrow \text{work if } {}^{2}/_{3}*9*^{3/2} - ½ P^2 < {}^{2}/_{3}*8.5*^{3/2}$$
$$\rightarrow P < 1.719866$$

So when P is 2 or higher, they will not work.. Those whose pain is an element of (2,…,10), or 4.5% of the population, will not work, and the labor force participation rate is 95.5%. This increase in the "adverse event" is *inefficient*—people whose pain is 2, and therefore whose marginal social cost of working is lower than their marginal social benefit, now choose not to work even though social surplus increased when they did.