14.41, 2002
Final Exam Solutions

I. True False and Uncertain

1. Uncertain. The closed-end grant is preferable because it reduces inframarginal costs relative to the matching grant. The matching, however, provides marginal incentives to all states, not just the low spending states.

2. False. The theory of optimal fiscal federalism states that local provision of goods is optimal when the tax-benefit linkage is strong. The tax-benefit linkage of welfare is very low, suggesting local provision is not optimal. The theory suggests welfare should be provided by the federal government. A "race-to-the-bottom" may ensue if welfare is provided locally.

3. Uncertain. It is possible, perhaps likely, that many of the children who took up the program after its expansion previously had health insurance. Large inframarginal effects (i.e. the crowdout of private health coverage) would suggest the expansion is not efficient.

4. False. The simplified version of the Ramsey rule states that the optimal commodity tax sets the tax rate proportional to one over the elasticity of demand. Demand for prescription drugs is much less elastic than the demand for CDs. Therefore the tax on prescription drugs should be higher than the tax rate on CDs. Of course this may not be optimal on equity grounds, but the Ramsey rule only concerns efficiency.

5. False. The low price elasticity suggests that tax expenditures will be ineffective at increasing the level of charitable giving to wetlands organizations. The low elasticity with respect to government spending suggest that government provision of wetlands preservation will induce very little crowdout of charitable giving to wetlands organizations. As a result, direct government spending is most efficient.

6. Uncertain. The move to a consumption tax would stimulate savings. The current income tax features double taxation of savings. Assuming that we are currently saving too little, the move to a consumption tax would lead to major efficiency gains. In addition, the consumption tax would likely have lower administrative costs. A consumption tax is regressive and would therefore not be an improvement on equity grounds. The change would also have equity implications by generation. The elderly, who have already largely finished paying their income tax, would in effect face double taxation after the move to the consumption tax. The young might benefit from the increased capital stock. The increased capital stock would increase economy wide efficiency and lead to higher lifetime wages.

II. Short Answer

1. As noted by Peltzman, the U.S. system of public provision of education leads to crowdout. Many individuals who would like more education than is publicly provided, consume the publicly provided amount anyway. Vouchers would solve the under consumption problem. There are strong reasons to believe vouchers would increase efficiency. Vouchers would allow schools to more closely match the preferences of students, increasing efficiency. In addition, the competition created would increase efficiency by driving poor schools out of business and cutting waste out of the system (i.e. the large administrative structures found in most public school systems). Note that the Tiebout hypothesis suggests that public provision of education may already be efficient, however. There are several possibilities that suggest vouchers might decrease efficiency. Public education may generate large public benefits. If vouchers allow students to sort into very specialized schools (i.e. football schools), the public benefits of education may decrease. Vouchers may increase stratification along many dimensions - income, race, ability level of students, etc. Spillover effects (talented students having a positive effect on less talented students for instance) make it possible that reducing stratification increases efficiency. Vouchers may therefore decrease efficiency by increasing stratification. Note that it is also possible that vouchers would decrease stratification along some dimensions - i.e. a talented, but poor inner-city student can now attend a good school in the suburbs. There might be informational problems which would prevent parents from efficiently using the vouchers In fact, empirical evidence suggests that the take-up rate for vouchers is quite low. Finally, vouchers would have very large inframarginal effects and this is clearly inefficient.

2. Privatizing Social Security by moving to individual annuitized accounts has several significant advantages. Individual accounts would represent real savings. The crowdout of savings induced by S.S. would be eliminated. Because individuals would claim all benefits which accrued to the account, the distortion to labor supply caused by S.S. would be eliminated. Finally, individuals would likely be able to earn a higher rate of return than S.S. does and the problems associated with choosing where to invest the S.S. trust fund would be eliminated. There are several disadvantages to moving to individual accounts, the largest of which is how to transition to the new system. Today's elderly would still have to be given S.S. With the S.S. payroll tax eliminated in favor of individual accounts, the funding source for the benefits of today's elderly is unclear. The new system would not have S.S.'s redistributive element and might be less efficient due to much higher administrative costs. Finally, it is not clear that allowing individuals to make the investment decisions for their annuitized accounts makes sense. The government would, in effect, be saying that individuals aren't smart enough to save on their own, but they are smart enough to pick their own portfolios.

III. Labor Supply and Welfare

(See attached graphs)

a)
This is a Cobb-Douglas utility function:

$$c = \frac{y * \frac{2}{3}}{P_c} \tag{1}$$

$$l = \frac{y * \frac{1}{3}}{P_l} \tag{2}$$

Y, potential income, is equal to the total number of hours that could be worked times the effective wage (which is 3 since child care must be paid):

$$y = 160 * 3 = 480 \tag{3}$$

$$c = \frac{480 * \frac{2}{3}}{1} = 320 \tag{4}$$

$$l = \frac{480 * \frac{1}{3}}{3} = 53\frac{1}{3} \tag{5}$$

$$h = 160 - l = 160 - 53\frac{1}{3} = 106\frac{2}{3} \tag{6}$$

b)

The mother will either accept the NIT and not work at all or work the number of hours in part a.
Utility if not accepting the NIT:

$$\frac{2}{3}\ln 320 + \frac{1}{3}\ln 53\frac{1}{3} = 5.171\,1 \tag{7}$$

Utility if accepting the NIT:

$$\frac{2}{3}\ln 210 + \frac{1}{3}\ln 160 = 5.256\,5 \tag{8}$$

The mother accepts the NIT and does not work at all. Formerly, the mother had an income of 320. Now she has an income of 210. The NIT has actually led to a reduction in the income of the single mother.

c)

The mother will either accept the NIT and not work at all or work the number of hours in part a.

Utility if not accepting the NIT:

$$\frac{2}{3}\ln 320 + \frac{1}{3}\ln 53\frac{1}{3} = 5.1711 \tag{9}$$

Utility if accepting the NIT:

$$\frac{2}{3}\ln 100 + \frac{1}{3}\ln 160 = 4.7618 \tag{10}$$

The mother declines the NIT and chooses to work $106\frac{2}{3}$ as in part a).

d)

Now the effective wage, or the price of leisure, is \$6 per hour.

$$y = 160 * 6 = 960 \tag{11}$$

$$c = \frac{960 * \frac{2}{3}}{1} = 640 \tag{12}$$

$$l = \frac{640 * \frac{1}{3}}{6} = 53\frac{1}{3} \tag{13}$$

$$h = 160 - l = 160 - 53\frac{1}{3} = 106\frac{2}{3} \tag{14}$$

Utility if not participating in the NIT:

$$\frac{2}{3}\ln 640 + \frac{1}{3}\ln 53\frac{1}{3} = 5.6332 \tag{15}$$

Utility if participating in the NIT:

$$\frac{2}{3}\ln 210 + \frac{1}{3}\ln 160 = 5.2565 \tag{16}$$

The mother will choose to decline the NIT and work $106\frac{2}{3}$ hours. The total government cost is the cost of paying for the child care: $106\frac{2}{3} * \$3 = \$320$
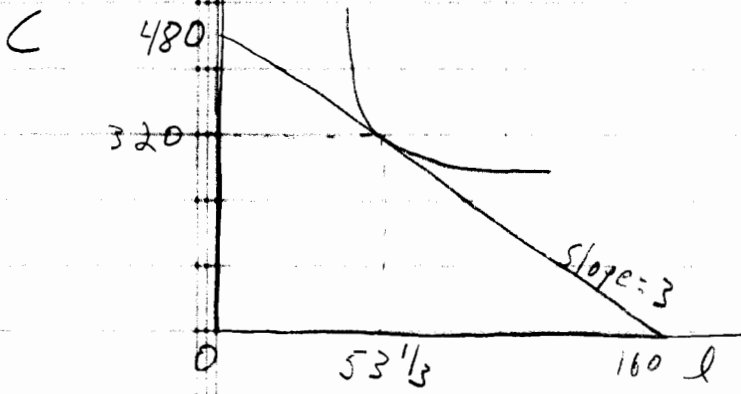
The total government cost for part b) is the NIT subsidy of \$210. For the program in part d), efficiency is $\frac{640}{320} = 2$. For the program in part b), efficiency is $\frac{210}{210} = 1$. The part d) program is more efficient.
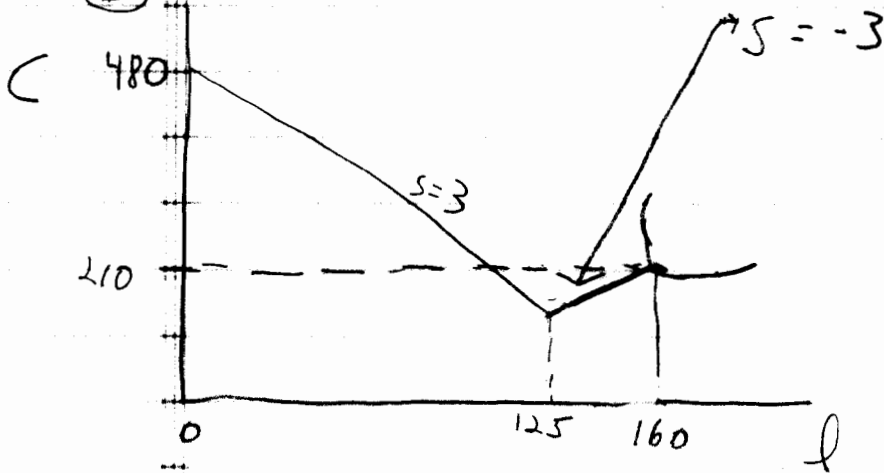
e)

Nicholas and Zeckhauser present a model under which in-kind welfare, such as food stamps, increases targeting efficiency. Food stamps are likely an indicator good - at a given level of income, demand for food stamps is higher for low ability individuals. Use of indicator good increases targeting efficiency. Food stamps may also represent an ordeal mechanism which would also tend to increase targeting efficiency. See Section Handout 11 for a more complete explanation.
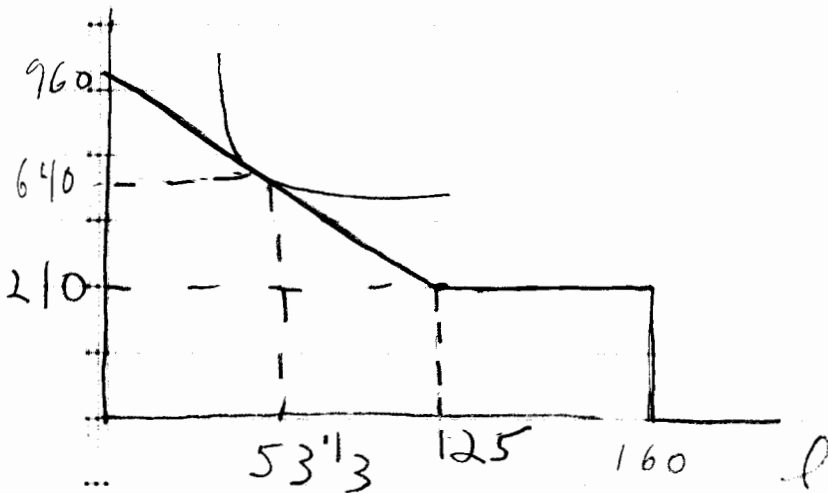
III. GRAPHS

A.

C

480

320

Slope = 3

0   53 1/3   160   l

B.

C

480

S = 3

S = -3

210

0   125   160   l

D.

960

640

210

53 1/3   125   160   l

IV. Social Insurance Mandates and DWL
(See attached graphs)
a)

$$
\begin{align}
L_s &= L_d \tag{17} \\
30 - w &= \frac{w}{2} \tag{18} \\
w &= 20 \tag{19} \\
L &= 10 \tag{20}
\end{align}
$$

b)

$$
\begin{align}
L_s &= L_d \tag{21} \\
30 - w - \frac{3}{2} &= \frac{w}{2} \tag{22} \\
w &= 19 \tag{23} \\
L &= \frac{19}{2} \tag{24}
\end{align}
$$

$$
\begin{align}
DWL &= \frac{1}{2} * |\Delta L| * \tau \tag{25} \\
DWL &= \frac{1}{2} * |10 - \frac{19}{2}| * \frac{3}{2} \tag{26} \\
DWL &= .375 \tag{27}
\end{align}
$$

c)

$$
\begin{align}
L_s &= L_d \tag{28} \\
30 - w - \frac{3}{2} &= \frac{w + \frac{3}{2}}{2} \tag{29} \\
w &= 18\frac{1}{2} \tag{30} \\
L &= 10 \tag{31}
\end{align}
$$

There is no change in quantity, so DWL = 0. The DWL is zero because, unlike part b), workers fully value the annuity mandate. The demand curve shifts inward, as in part b), but the supply curve shifts outward. The wage is lower, but the quantity of L is the same as in part a).

d)

5

$$L_s = L_d \tag{32}$$

$$30 - w - \frac{3}{2} = \frac{w + \frac{3}{2} * \frac{1}{2}}{2} \tag{33}$$

$$w = 18\frac{3}{4} \tag{34}$$

$$L = 9\frac{3}{4} \tag{35}$$

$$DWL = \frac{1}{2} * |10 - 9\frac{3}{4}| * \frac{3}{4} \tag{36}$$

$$DWL = .09375 \tag{37}$$

The DWL is larger because the workers only value the mandate at half its cost to the employer. As a result, there is a change in the quantity of L and DWL results.
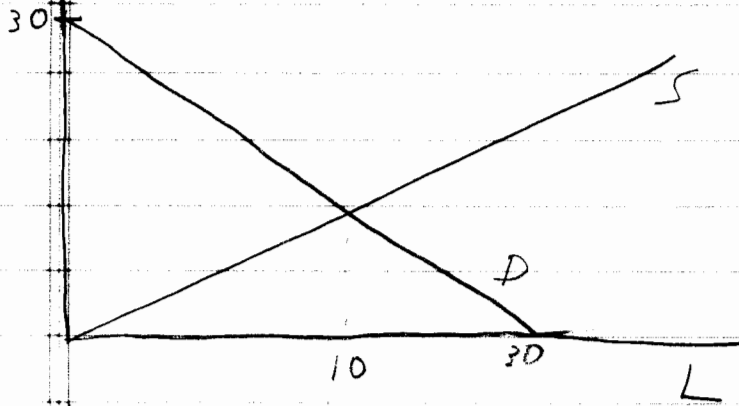
e) Firms may not offer annuities even if a $= 1$ due to problems with adverse selection.
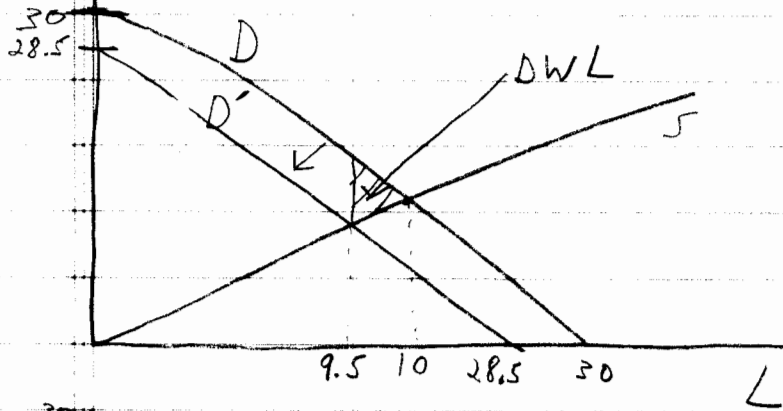
f) a> 1

If workers value the annuities more than the cost to employers, employment will actually exceed the pre-mandate equilibrium. Workers may value the annuity at more than the cost if, due to market failures such as adverse selection, they are unable to purchase an annuity outside of the workplace. Also, if the insurance receives preferred tax treatment (as health insurance does in the U.S.) then the workers will value it at more than the cost to employers.
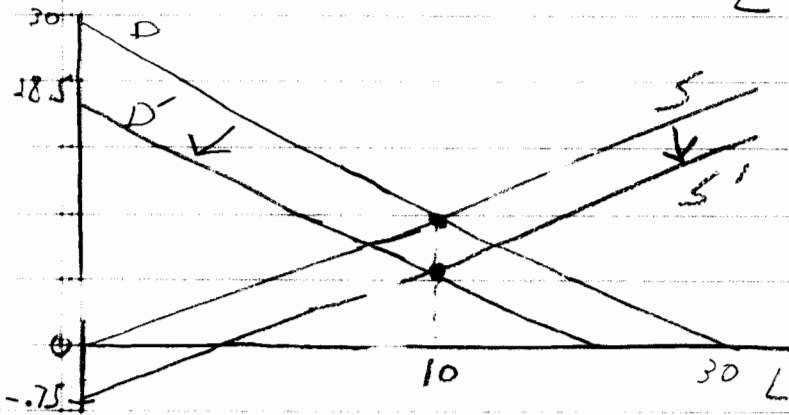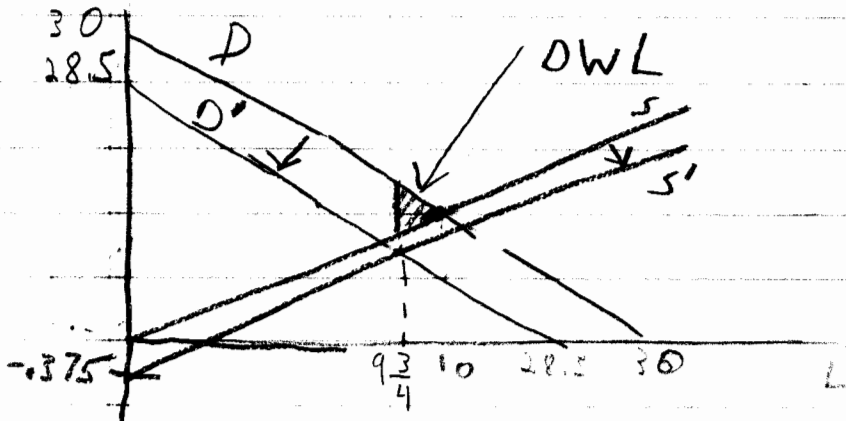
I V GRAPHS

A

W

30

S

D

10   30

L

B

W

30
28.5

D

DWL

D'

S

9.5 10 28.5   30

L

C

W

30

D

18.5

D'

S

S'

0

10

30 L

-.75

D

W

30
28.5

D

DWL

D'

S

S'

-.375

$9\frac{3}{4}$ 10 28.5 30

L

V. Insurance
a)
$$E(U) = (1 - \alpha)\log(w + 5) + \alpha\log(5) \tag{38}$$

b)

break even condition dictates the benefit level, b:

$$\tau w(1 - a) - b\alpha = 0 \tag{39}$$

$$b = \tau w \frac{1 - \alpha}{\alpha} \tag{40}$$

$$\max_{\tau} E(U) \tag{41}$$

$$\max_{\tau}[(1 - \alpha)\log(w(1 - \tau) + 5) + \alpha\log(5 + \frac{1 - \alpha}{\alpha}\tau w)] \tag{42}$$

F.O.C

$$\frac{(1 - \alpha)}{w(1 - \tau) + 5} * -w + \frac{\alpha}{5 + \frac{1-\alpha}{\alpha}\tau w} * \frac{1 - \alpha}{\alpha}w = 0 \tag{43}$$

$$\frac{(\alpha - 1) * w}{w(1 - \tau) + 5} + \frac{(1 - \alpha)w}{5 + \frac{1-\alpha}{\alpha}\tau w} = 0 \tag{44}$$

$$\frac{\alpha - 1}{w(1 - \tau) + 5} = \frac{\alpha - 1}{5 + \frac{1-\alpha}{\alpha}\tau w} \tag{45}$$

$$w(1 - \tau) + 5 = 5 + \frac{1 - \alpha}{\alpha}\tau w \tag{46}$$

$$\tau = \alpha \tag{47}$$

$$b = w(1 - \alpha) \tag{48}$$

c) Yes, there are welfare gains. These occur because, due to the log utility, the workers are risk adverse and therefore value the insurance provided by the Worker's Comp system.

d) If U $= \frac{1}{2}C$, then the workers are no longer risk adverse and do not value the insurance. There is no welfare gain to introducing Worker's Comp.

e)
$$E(U) = (1 - \alpha)\log(w + 5) + \alpha\log(kw + 5) \tag{49}$$

f)

$$\max_{\tau} E(U) \tag{50}$$

$$\max_{\tau}[(1 - \alpha)\log(w(1 - \tau) + 5) + \alpha\log(kw + 5 + \frac{1 - \alpha}{\alpha}\tau w)] \tag{51}$$

7

F.O.C

$$\frac{(1-\alpha)}{w(1-\tau)+5} * -w + \frac{\alpha}{kw+5+\frac{1-\alpha}{\alpha}\tau w} * \frac{1-\alpha}{\alpha}w \; = \; 0 \tag{52}$$

$$\frac{(\alpha-1)*w}{w(1-\tau)+5} + \frac{(1-\alpha)w}{kw+5+\frac{1-\alpha}{\alpha}\tau w} \; = \; 0 \tag{53}$$

$$\frac{\alpha-1}{w(1-\tau)+5} \; = \; \frac{\alpha-1}{kw+5+\frac{1-\alpha}{\alpha}\tau w} \tag{54}$$

$$w(1-\tau)+5 \; = \; kw+5+\frac{1-\alpha}{\alpha}\tau w \tag{55}$$

$$\tau \; = \; (1-k)\alpha \tag{56}$$

$$b \; = \; w(1-k)(1-a) \tag{57}$$

g) Yes, there are gains, but they are smaller than in part c). They are smaller because spousal employment is already providing a level of insurance against injury.