

Second Hour Exam
Public Finance - 180.365
Fall, 2001
Answers

This exam consists of three parts. You must answer all components of all parts of the exam.

Part I. True/False. (20 points) Decide whether each of the following statements is true or false. You do *not* need to discuss or justify your answer.

- F 1. Despite the “War on Poverty” launched in the 1960s, the poverty rate in the US has steadily trended up since the late 1950s.

Answer: False. The poverty rate fell throughout the 1960s and mid-70s. It rose from the 70s to the mid-80s, stayed roughly flat from the mid-80s to the mid-90s, and has fallen somewhat over the last five years or so.

- T 2. Income inequality is greater in the US than in most other rich countries.
- T 3. In the moral philosophy of John Rawls, the only important characteristic of an economy is how it treats its poorest citizen.
- T 4. According to the standard economic theory of saving, a “Fully Funded” Social Security system would have no effect on the national saving rate.
- T 5. Empirical evidence suggests that much more of the increase in wage inequality in the US over the last 30 years has been due to technological progress than to increased trade.

Answer: True. The *Economist* article “Profits Over People” reports that the increase in inequality due to increasing trade has been only about 1/4 as important as technological progress in causing increased inequality.

- F 6. The fact that in the long run returns on a PAYG Social Security system depend on wage growth and population growth, which are uncertain, means that it would be better if people saved for their own retirement without these risks.

Answer: False. It is true that SS returns depend on wage and population growth, but financial market returns are even more uncertain than wage and population growth.

- F 7. John Stuart Mill believed that rights like freedom of speech should be maintained out of a sense of “Procedural Justice.”

Answer:

False. Mill believed that it was important to have rights like freedom of speech, but only because he thought that societies with rights of this kind would eventually be happier (in the utilitarian sense) than societies that did not permit individual rights.

- F 8. The “Samaritan’s Dilemma” argument for Social Security relies on the assumption that people are too stupid to perceive their own self-interest.
- T 9. The “Ulysses Paternalism” argument for Social Security would still hold true even if people knew exactly how much they should save for retirement.
- F 10. A “Fully Funded” Social Security system that paid a positive interest rate would be impossible to maintain forever in an economy with no population growth or wage growth.

Part II. Short Discussion Questions (20 points).

In two or three sentences, briefly comment on each of the following assertions, indicating whether it is true, false, or uncertain and why. Your score will depend on the quality of your answer, not just on whether you get the True, False, or Uncertain part right.

- 5 pt 1. Poor people should value the ‘lifetime income insurance’ aspect of Social Security more than rich people.

Answer: False. The ‘lifetime income insurance’ aspect of Social Security is basically that your benefits in retirement move much less than one-for-one with your wages when working. Therefore a (currently) rich person with a high-paying job knows that even if he loses that job and has to work as a janitor the rest of his life, his retirement income will not fall by nearly as much as his current income. By contrast, a poor person will already be getting very generous benefits compared to his contributions, so the poor person does *not* value the insurance aspect very much, since it says that his retirement income won’t go up all that much even if he gets rich.

- 5 pt 2. The fact that a private market for annuities exists undermines the argument that Social Security should exist to prevent people from ‘outliving their assets.’

Answer: False. The annuity market that exists is quite small, because it turns out that people know a lot about their future life expectancy so that those who actually buy annuities have a mortality rate of around half the mortality rate in the general population. This is an example of an adverse selection problem, and the existence of severe adverse selection problems in this market *strengthens* the argument for why government intervention to provide annuities is necessary.

- 5 pt 3. The people who make their living as scavengers on “Smokey Mountain” in the Phillipines is a good illustration of how vulnerable the third world poor are to exploitation, and therefore suggests that allowing multinational companies to set up factories in the Phillipines would make Phillipinos worse off.

Answer:

False. This is based on the Krugman reading. The “Smokey Mountain” scavengers made their living by picking through a garbage dump looking for anything valuable. No outside force was causing them to live on the garbage dump - indeed, as Krugman indicates, the Phillipines authorities eventually forced the scavengers to give up their living because the government found them so embarrassing.

The fact that there were people willing to do something this awful for a living demonstrates just how desperately poor many people in the Phillipines

are. It also proves that people can and will move to opportunities to better their lives. Finally, it illustrates why the fact that workers in the Phillipines are paid less than US workers in comparable jobs does not constitute exploitation - surely anybody previously living on “Smokey Mountain” would be delighted to have a sweatshop job that an American might disdain.

- 5 pt 4. A government that allowed completely free trade with all other countries would be particularly vulnerable to bribery and corruption by multinational corporations.

Answer:

False. As the Economist article “Globalisation and Its Critics” points out, if your rule is completely free trade, then there is nothing left for the government to ‘sell’ to outsiders who want access to its markets. A government with free trade is uniquely immune from corruption.

Part III. (60 points)

Consider a society like the one discussed in class in which consumers have only two periods of life, ‘youth’ and ‘old age.’ Assume that the only role of government in this society is to run a Pay As You Go (PAYG) Social Security system in which total Social Security taxes paid by the young in a period are equal to total benefits paid to the old in that period; for example, for period $t - 1$,

$$P_{t-1}\tau_{y,t-1} = -P_{t-2}\tau_{o,t-1}, \quad (1)$$

where $\tau_{y,t-1}$ is the per-capita level of ‘net taxes’ (taxes minus benefits received) paid by the young generation in period $t - 1$, $\tau_{o,t-1}$ is the per-capita level of net taxes paid by the old in that period, P_{t-1} is the size of the generation of young consumers in period $t - 1$ and P_{t-2} is the size of the generation that was young in period $t - 2$ (and is therefore the size of the generation that is old in period $t - 1$).

Call N_t the population growth factor between period $t - 1$ and period t :

$$N_t = P_t/P_{t-1} \quad (2)$$

and assume that the society has always had a population that was growing by a factor $\bar{N} = (1 + \bar{n})$ from generation to generation up to period t : $N_t = N_{t-1} = \dots = \bar{N}$. Assume also that the level of per-capita Social Security benefits has also been constant from generation to generation, $\tau_{o,t} = \tau_{o,t-1} = \tau_{o,t-2} = \tau_{o,t-3} = \dots = -\tau^*$ (recall that since $\tau_{o,t}$ is net taxes it will be a negative number if the old receive benefits greater than they pay in taxes). Finally, assume that the net real interest rate is constant at r (implying that the interest factor used for discounting future income, $R = 1 + r$, is also constant).

- 10 pt 1. Explain the meaning and use of the ‘generational account’ for a generation born in period t ,

$$GA_t = \tau_{y,t} + \tau_{o,t+1}/R, \quad (3)$$

and explain why the net rate of return on generation t ’s Social Security contributions is

$$\text{Net Return}_t = -\tau_{o,t+1}/\tau_{y,t} - 1. \quad (4)$$

Answer:

The generational account summarizes the amount by which the PDV of lifetime taxes paid exceeds the PDV of lifetime benefits received from government transfer programs. GA’s can be used to compare how the government is treating different generations differently.

$-\tau_{o,t+1}/\tau_{y,t}$ is simply the ratio of benefits received when old to taxes paid when young. If net benefits received were equal to taxes paid, the net rate of return would be zero because in this case $-\tau_{o,t+1} = \tau_{y,t}$.

- 10 pt 2. Show that the tax level on the $t - 1$ generation that is necessary to finance per-capita benefits of $-\tau^*$ for the generation born in $t - 2$ in this PAYG Social Security system is

$$\tau_{y,t-1} = \tau^*/\bar{N}. \quad (5)$$

Answer:

Equation (1) tells us that

$$P_{t-1}\tau_{y,t-1} = -P_{t-2}\tau_{o,t-2} \quad (6)$$

$$(P_{t-1}/P_{t-2})\tau_{y,t-1} = \tau^* \quad (7)$$

$$\bar{N}\tau_{y,t-1} = \tau^* \quad (8)$$

$$= \tau^*/\bar{N}. \quad (9)$$

- 10 pt 3. Calculate the generational account and the net return on Social Security contributions for the generations born at times $t - 1$, $t - 2$, and earlier in terms of τ^* and \bar{N} , and show that the net rate of return on Social Security taxes is n for all generations born before t .

Answer:

$$GA_{t-1} = \tau_{y,t-1} + \tau_{o,t}/R \quad (10)$$

From the previous question, we know that

$$\tau_{y,t-1} = \tau^*/\bar{N}. \quad (11)$$

Therefore the GA of the generation born at $t - 1$ is

$$GA_{t-1} = \tau^*(1/\bar{N} + 1/R) = \left(\frac{R - \bar{N}}{R\bar{N}}\right)\tau^*. \quad (12)$$

The net rate of return is

$$-\tau_{o,t}/\tau_{y,t-1} - 1 = -\tau^*/((1/\bar{N})\tau^*) - 1 \quad (13)$$

$$= \bar{N} - 1 \quad (14)$$

$$= \bar{n} \quad (15)$$

All of these calculations are identical for generations born in $t - 2$ and earlier.

- 10 pt 4. Explain how a positive rate of return on Social Security can be paid even though no money is being saved. Discuss what the relationship between R and \bar{N} tells you about whether PAYG Social Security is a good or a bad deal for generations that are young or unborn when the Social Security system is introduced.

Answer:

A positive return can be paid even though no money is being saved because each young generation is larger than its predecessor generation, and thus the tax base will always be larger than the population of beneficiaries. As long as population growth continues a positive return equal to the rate of population growth can be paid.

The GA tells us the amount by which Social Security taxes exceed Social Security benefits over the lifetime. If $R = \bar{N}$, the generational account is exactly zero, meaning that the consumer gets back exactly what he paid in PDV terms and therefore is neither helped nor hurt. If $R > \bar{N}$ the GA is positive, indicating greater taxes paid than benefits received, and vice versa if $\bar{N} > R$.

PAYG Social Security is always a good deal for the first generation of beneficiaries, because they get benefits without having paid taxes. For younger generations, whether it is a good deal or not depends on whether their GA is positive or negative. Therefore, PAYG Social Security is a good deal for young generations if $\bar{N} > R$ and vice versa.

Now suppose at time t the birth control pill is invented and as a result everyone knows that population growth will be slower forever in the future than it has been in the past. Specifically, suppose that population growth declines to zero, $N_{t+1} = N_{t+2} = \dots = 1$.

- 10 pt 5. Suppose the government declares that it intends to maintain Social Security benefits at $-\tau^*$ for all current and future old generations, no matter what that means for taxes on young generations. Calculate the generational accounts of the generations born in periods t , $t + 1$, and all future periods. Compare the generational accounts of the t , $t + 1$ and later generations to the GA's of earlier generations; in particular, state which generations are better off by comparing their GA's.

Answer:

$$GA_t = \tau_{y,t} + \tau_{o,t+1}/R \quad (16)$$

Equation (1) tells us that

$$P_t \tau_{y,t} = -P_{t-1} \tau^* \quad (17)$$

$$\underbrace{(P_t/P_{t-1})}_{=N_t=\bar{N}} \tau_{y,t} = -\tau^* \quad (18)$$

$$\tau_{y,t} = -\tau^*/\bar{N}. \quad (19)$$

Therefore the GA of the generation born at t is

$$GA_t = \tau^*(1/\bar{N} + 1/R) = \left(\frac{R - \bar{N}}{R\bar{N}} \right) \tau^* = \tau^*(r - n)/R\bar{N} \quad (20)$$

which is the same as before the population slowdown.

The GA for the generation born at $t + 1$ is

$$GA_{t+1} = \tau_{y,t+1} + \tau_{o,t+2}/R \quad (21)$$

Equation (1) tells us that

$$P_{t+1}\tau_{y,t+1} = -P_t\tau^* \quad (22)$$

$$\tau_{y,t+1} = -\underbrace{(P_t/P_{t+1})}_{=1/N_{t+1}=1} \tau^* \quad (23)$$

$$= -\tau^*. \quad (24)$$

Therefore the GA of the generation born at $t + 1$ is

$$GA_t = \tau^* - \tau^*/R = \tau^*(1 - 1/R) = \tau^*(r/R) \quad (25)$$

The GA's of the generations born in period $t + 2$ and later are identical to the GA for the generation born in $t + 1$.

This analysis indicates that when there is a permanent slowdown in population growth, the government can promise to insulate current generations from the financial consequences, but cannot insulate future generations.

Gens t and before	Gens $t + 1$ and after
$\tau^*(r - n)/R\bar{N}$	$\tau^*(r/R)$

In a comparison of the GA's, the GA's of the $t + 1$ and later generations are unambiguously larger (assuming positive r and n), since $r - n < r$ and $R\bar{N} > R$. A larger positive GA means the young generations are treated worse than the old ones.

- 10 pt 6. Now suppose the government declares that it intends to maintain Social Security taxes on the young at their initial level of τ^*/\bar{N} for all future young, no matter what that means for benefits for old generations. Calculate the generational accounts of the generations born in periods t , $t + 1$, and all future periods, and compare them to the results when the government kept benefits fixed.

Answer:

$$GA_t = \tau_{y,t} + \tau_{o,t+1}/R \quad (26)$$

Equation (1) tells us that

$$P_{t+1}\tau^*/\bar{N} = -P_t\tau_{o,t+1} \quad (27)$$

$$\tau_{o,t+1} = -(P_{t+1}/P_t)\tau^*/\bar{N} \quad (28)$$

$$= -\tau^*/\bar{N}. \quad (29)$$

Therefore the GA of the generation born at t is

$$GA_t = \tau^*/\bar{N} - (\tau^*/\bar{N})/R = \tau^*(r/R\bar{N}) \quad (30)$$

In contrast to the situation when benefits were kept fixed, the transition generation is worse off. That's because it pays the same taxes as before, but gets lower benefits when old.

The GA for the generation born at $t + 1$ is

$$GA_{t+1} = \tau_{y,t+1} + \tau_{o,t+2}/R \quad (31)$$

Equation (1) again tells us that

$$P_{t+2}\tau^*/\bar{N} = -P_{t+1}\tau_{o,t+2} \quad (32)$$

$$\tau_{o,t+2} = -(P_{t+2}/P_{t+1})\tau^*/\bar{N} \quad (33)$$

$$= -\tau^*/\bar{N}. \quad (34)$$

Therefore the GA of the generation born at $t + 1$ is

$$GA_t = \tau^*/\bar{N} - (\tau^*/\bar{N})/R = (\tau^*/\bar{N})(1 - 1/R) = \tau^*(r/R\bar{N}), \quad (35)$$

the same as for the generation born at t . All future generations will have the same GA as the transition generation. However, comparing these GA's to the GA's that these generations would have had under the policy of keeping benefits of the old fixed, it is clear that the future generations are now better off. They are better off because the transition generation is not paid as much as it was paid under the keep-benefits-fixed policy.