Name ________________________

# Final Exam
## Public Finance - 180.365
## Fall, 2000
## Answers

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

**Part I (30 Points). Multiple Choice Questions** Write the letter corresponding to the correct answer in the space to the left of the question.

c. 1. A difference between normative and positive analysis is that

(a) only normative analysis is relevant for choosing among policy options.
(b) positive analysis deals with facts and cannot be a source of disagreement.
(c) positive analysis is descriptive whereas normative analysis is evaluative.
(d) normative analysis is ignored by economists because they have no expertise in making value judgments.

b. 2. Which is not true of utilitarianism?

(a) It was espoused by Jeremy Bentham.
(b) It implies that a dollar given to one person is as important as a dollar given to anyone else.
(c) It assumes that social welfare is determined by the welfare of individuals.
(d) It encourages redistribution when there is diminishing marginal utility of income.

c. 3. Which is not true of Rawlsian social welfare functions?

(a) They assume that the welfare of the middle class is unimportant.
(b) They are derived from a concept of justice.
(c) They treat everyone equally.
(d) They focus attention on the least advantaged individual.

c. 4. Which is not necessarily true of a public good?

(a) It costs nothing to let an additional person consume it.
(b) It costs a lot to keep an additional person from consuming it.
(c) It is supplied by the public sector.
(d) It can be a negative thing, that is, a public bad.

a. 5. Which is *not* a potential financial problem facing the social security system?

(a) The inflation rate has been declining.
(b) The number of retirees is increasing.
(c) The ratio of workers to retirees is decreasing.
(d) Life expectancy beyond retirement age has been increasing.

d. 6. Social security is financed in all but which one of the following ways?

(a) A payroll tax on employers
(b) A payroll tax on employees
(c) A tax on one generation's workers to support another's retirees
(d) A general income tax.

d. 7. If introducing social security coverage induces people to retire earlier than they otherwise would have, this may be an example of

(a) deadweight loss.
(b) moral hazard.
(c) excess burden.
(d) all of the above.

a. 8. If married women have greater labor supply elasticities than single women, efficiency considerations might suggest that an income tax should tax

(a) the married women at lower marginal rates.
(b) the single women at lower marginal rates.
(c) all women at the same marginal rates.
(d) only the married women.

c. 9. An ad valorem tax imposed by the United States on vintage French champagne is probably

(a) regressive.
(b) proportional.
(c) progressive.
(d) borne entirely by the importing country.

d. 10. Another term sometimes used for excess burden is

(a) welfare cost.
(b) deadweight loss.
(c) efficiency cost.
(d) all of the above.

d. 11. A lump-sum tax causes

(a) income and substitution effects that reinforce each other.
(b) income and substitution effects that offset each other.
(c) no income effect.
(d) no substitution effect.

d. 12. An optimal tax structure will depend on

(a) elasticities of supply and demand.
(b) the set of available taxes.
(c) the social welfare function.
(d) all of the above.

b. 13. A simple Ramsey tax system would tend to tax

(a) high wages more heavily than low wages.
(b) food more heavily than perfume.
(c) trips to Holland more heavily than commuting to work.
(d) all goods equally.

b. 14. Which of the following is not true of the deadweight loss from a small commodity tax?

(a) It is zero if the demand curve is completely inelastic.
(b) As the tax rate is increased, the deadweight loss also increases, but at a slower rate.
(c) It measures a loss in revenue relative to a lump-sum tax that causes the same decline in utility.
(d) It can be represented by a triangle under a demand curve.

a. 15. Commodity taxes are most likely to be a useful part of an optimal tax system if there are major consumption goods that are price

(a) inelastic and income elastic.
(b) elastic and income elastic.
(c) inelastic and income inelastic.
(d) elastic and income inelastic.

d. 16. Moral hazard refers to the incentive for

(a) clients to mislead insurance companies with incomplete information.
(b) insurance companies to interpret policies as not covering certain expensive occurrences.
(c) hospitals to refuse high-quality care to the indigent.
(d) people to behave differently with insurance than without it.

b. 17. Adverse selection in health insurance markets can lead to

   (a) individuals choosing to see low quality doctors.
   (b) ‘cream skimming’ among consumers by some insurance companies, leaving a pool of high-risk, high-cost consumers unable to purchase insurance at a reasonable cost.
   (c) doctors choosing to give excess tests and treatments.
   (d) individuals’ choosing excessive insurance coverage and thus overconsuming health care.

d. 18. In the US, third parties pay for approximately which fraction of health care expenditures?

   (a) 20 percent
   (b) 50 percent
   (c) 70 percent
   (d) 80 percent

c. 19. Which of the following is not a condition for adverse selection to occur?

   (a) People (buyers or sellers) have different risk characteristics.
   (b) Buyers have more information than sellers, or vice versa.
   (c) The people with more information cannot prove that they are telling the truth to the other party.
   (d) Sellers have some market power.

d. 20. Which of the following does not (by itself) cause problems in the efficiency of the health care market?

   (a) Adverse selection.
   (b) Moral hazard.
   (c) Tax distortions.
   (d) Technological innovation.

**Part II (30 points). True/False/Uncertain Questions** Decide whether the following statements are True, False, or Uncertain. *Explain your reasoning.* Your score will be based not just on whether you get the True, False, Uncertain part right but also heavily on the quality of your explanation.

___ 1. The fact that cigarette sales do not change much when cigarette taxes are increased allows us to conclude that cigarette companies bear most of the burden of the cigarette tax.

*Answer:*

False. The fact that cigarette sales do not change much implies that either supply or demand is inelastic. If supply is inelastic, then the cigarette companies bear most of the burden. If demand is inelastic then smokers bear most of the burden of the tax.

___ 2. Social Security is a regressive program because you only have to pay Social Security taxes on income up to a maximum cap amount per year.

*Answer:*

It is true that, examined on a yearly basis, Social Security taxes are regressive, for the reason stated in the question. But on a lifetime basis, Social Security is a progressive program, because low-lifetime-income households get a much higher return on their contributions than do high-lifetime-income households.

___ 3. Eliminating the 'marriage penalty' by allowing individual members of a couple to file their taxes separately would provide a tax incentive in favor of the traditional family where one spouse works and the other stays at home.

*Answer:*

False. Eliminating the marriage penalty would create a tax system where a couple with two earners will pay lower taxes than a couple with a single earner at the same level of household income. Thus eliminating the marriage penalty provides a tax incentive in favor of the two-earner couple.

___ 4. Most public finance economists think gasoline taxes are good because the 'excess burden' of such taxes is low since consumption of gasoline does not change much when the gas tax rises.

*Answer:*

While it is true that most PF economists think gasoline taxes are good, the reason is because burning gasoline creates a negative externality in the form of pollution. The gasoline tax helps correct the externality, which has nothing to do with excess burden.

___ 5. The economic theory of property taxation states that when a new (and permanent) property tax is imposed, only future owners of the property bear the burden of the tax.

*Answer:* False. The theory of property taxation says that the taxes get 'capitalized' into the price of the property. This means that the person who owned it when the tax was imposed bears the full burden of the tax. Future owners of the property bear none of the burden, because they will have paid a price for the property that is lower by an amount that should exactly compensate them for the annual tax payments.

___ 6. In evaluating the economic efficiency of various commodity taxes, it is not safe to assume that the excess burden of a tax is measured well by the total amount of tax revenue raised by that tax.

*Answer:* True. A tax can impose a large excess burden even if it raises no revenue. Think of the example of the cable TV tax again.

___ 7. Recently, some tax analysts have proposed a tax break that would allow people to save unlimited amounts of money in retirement saving plans where interest income is allowed to accumulate tax free. The effect of such a plan would be to raise the saving rate.

*Answer:* Uncertain. Whether an increase in the after-tax rate of return increases or reduces the saving rate depends on the interest elasticity of saving. Theory says that the interest elasticity could be positive or negative, so we don't know whether reducing taxation on interest will increase or reduce the saving rate.

___ 8. Because monopoly profits are simply an income distribution issue, the conditions for the Fundamental Theorem of Welfare Economics are satisfied in an economy with some oods provided by monopolies.

*Answer:* False. The FTWE requires perfect competition, because without perfect competition the price of a good will differ from its marginal cost, making the economy's marginal rate of transformation different from its marginal rate of substitution.

___ 9. The theory of welfare economics suggests that the government should pay for development costs for new drugs.

*Answer:* True. Once an effective drug is invented, it produces maximum social benefit if its price is equal to the cost of production. If the drug is invented by the government, the government can give away the formula and allow perfectly competitive drug firms to compete to manufacture it at the lowest price. If the drug is invented by a drug company who gets a patent on it, the drug company will almost certainly charge a price far in excess of marginal cost. Thus society is (in principle) better off if the government develops the drug.

___ 10. The financial condition of a Pay As You Go Social Security system is improved by the birth of an unexpectedly large Baby Boom generation.

*Answer:* True - so long as the Baby Boom generation has the same number of kids per person as previous generations did. The problems of the US Social Security system are caused not by the large size of the Baby Boom but by the smaller size of the subsequent generations.

## Part III (40 points). Longer Questions.

(10 pt) 1. Consider the market for widgets. Assume that the supply is perfectly elastic at a price of \$10. Suppose an ad valorem sales tax of 60 percent is imposed on consumers of widgets.

(a) How would you compute the excess burden of the tax? (Give either a formula or a geometric answer, and define all terms used in your answer).

*Answer:*

The formula we derived in class was $B = (1/2)epqt^2$ where e is the elasticity of demand, p and q are the pre-tax price and quantity, and t is the *ad valorem* tax rate. Alternatively, a geometric approach is to say that excess burden corresponds to the triangular area between the demand curve and the supply curve between the original and the after-tax quantities.

(b) Assume that the demand function for widgets is $D = 70 - P$ where $P$ is the price paid by consumers and $D$ is the quantity demanded. Compute the excess burden of the widget tax.

*Answer:*

Plugging into the formula $e = -1/6, p = 10, q = 60, t = 0.6$ gives $B = 18$.

(c) What is the incidence of the tax?

*Answer:* Because supply is perfectly elastic, consumers of widgets bear the entire burden of the widget tax.

(20 pt) 2. A recent article in the New York Times reported that drug companies in India have recently managed to learn the formulas for producing a large number of drugs invented by American drug companies (including Viagra!). With the formula in hand, it is very cheap to make these drugs. The Indian drug companies have therefore begun producing these drugs and selling them at prices as low as one tenth the price charged by the US drug companies.

(a) Discuss the effects of the actions of the Indian drug companies on Pareto efficiency. (To be concrete, analyze the case of a specific drug $V$, which is sold in the US at a price of $P_U$ and in India at a price $P_I < P_U$; assume that the cost of production is the same in the US and India, $C$; assume that all industries in the US and India are perfectly competitive except for the US drug industry; and assume that the prices of goods other than the drug are the same in the US and India, $P_O$. You will not get full credit unless you correctly use the concepts of the marginal rates of transformation and substitution in your answer.)

*Answer:*

The theory of welfare economics says that Pareto optimality requires the marginal rate of transformation to be equal to the marginal rate of substitution. Drug customers in the US will purchase $V$ up to the point where the marginal rate of substitution between $V$ and other goods equals the ratio of their prices, $P_U/P_O$. But the marginal rate of transformation is given by the ratios of the costs of production, $C/P_O$. Since we know that $P_U > C$, we know that the drug market in the US is not Pareto efficient. In other words, there are people for whom a dose of $V$ would be worth more than it costs to produce that dose, but is worth less than the price charged, $P_U$. The fact that such people do not consume $V$ constitutes a Pareto inefficiency.

The Indian firms are charging a price that is equal to the cost of production, so Indian consumers will buy the socially efficient amount of drug $V$. Without these Indian drug companies, most or all of the Indian customers would not have been able too afford drug $V$, so the activities of the Indian firms do increase Pareto efficiency.

(b) The US drug companies say that they spent billions of dollars to develop their drugs, and that the Indian companies are stealing their intellectual property. If you were hired by the US drug companies to make an argument for why it is good for social welfare to allow them to charge high prices for their drugs, what argument would you make?

*Answer:*

You could argue that, if drug companies know that they will get more profits by inventing a new drug, they will devote more research into developing new drugs. If, on the other hand, they know that as soon as they invent a new drug and patent it, that drug will be copied and they won't get any profits from selling it in India, they will be less willing to invest the money to develop new drugs.

(c) Suppose that the US drug companies are successful in their efforts to use international law to get the Indian government to shut down the copycat Indian drug companies. Suppose further that it is true that Indians are much poorer than Americans so that no

Indians will buy the drug $V$ unless the price is fairly close to the value $P_I$ that was being charged by the Indian drug companies. Discuss the prices that the US drug company is likely to charge in India and in the US for the drug. Also discuss the likely effects on social welfare of a bill Congress debated earlier this year that would have made it very difficult for US drug companies to sell their products in other countries at lower prices than in the US.

*Answer:*

By assumption, $P_I$ was equal to the cost of production of the drug, so if they were to sell the drug in India at price $P_I$ the US drug companies would make essentially zero profits. However, the question said that Indian demand would be low unless the price charged was 'fairly close' to $P_I$. This indicates that the US drug firms could make a modest profit by charging a price slightly above $P_I$ in India, and a much higher price $P_U$ in the US. The extra profits earnable in India would also make the prospect of inventing new drugs somewhat more lucrative, and so the drug company would probably increase its investment in developing new drugs, which would benefit Indians and Americans alike.

The Congressional bill described would probably have the effect of preventing the US drug company from selling its product in India at all. It would also reduce the profits of the US drug company, and reduce its incentives to invent new drugs. Thus, the Congressional bill would be a very bad piece of legislation: It makes Indians, Americans, and the shareholders of the drug companies all worse off.

(d) The heavy-metal rock band Metallica has complained loudly about tracks of its songs that are being downloaded and passed around on the Internet for free. Newspapers have interviewed some of the people who have passed around Metallica tracks, who have said that nothing they were doing had hurt Metallica because they wouldn't have bought Metallica's albums anyway. What does this have to do with the case of the Indian drug companies?

*Answer:*

The arguments are virtually identical. The MP3 swappers are making exactly the same argument as the Indian drug companies: 'nobody gets hurt because we wouldn't have bought the product anyway.' Metallica is making exactly the same argument as the American drug companies: 'Our intellectual property is being stolen.' The conclusions are the same too: in the short run, swapping Metallica tracks for free is Pareto improving, but in the long run making all music available free on the Internet would greatly reduce the incentives to produce good music (because no musicians could make any money if their product is swapped on the Internet for free).

(10 pt) 3. During the Presidential campaign, George Bush said that the best way to provide prescription drug coverage to Medicare beneficiaries was to subsidize the purchase of private insurance. Suppose a study determines that the average drug bill of Medicare recipients is \$200 a month, and suppose Bush proposes a specific program in which vouchers are given to all Medicare recipients entitling them to a government subsidy of \$200 a month toward the premium of an insurance plan for buying prescription drugs. Discuss whether a plan of this kind would solve the problems of those seniors who already have typical drug bills far in excess of \$200 a month.

*Answer:*

In a plan of this kind, the problem of adverse selection is extreme. Think of what would happen to an insurer (company A) who offered a plan that was targeted toward the average consumer: In exchange for the Medicare recipient's voucher, it would pay for all drug bills. If all Medicare recipients joined this insurer, then its costs would match its expenses. But suppose another insurer, B, enters the market promising to pay only half of expenses over \$200, but to pay for a membership in a health club for its clients. Then the healthy people would buy coverage from B, because they also get the health club memberhship. The sick people would buy coverage from A. Thus the people buying from A would have monthly medical bills much greater than \$200 per month. Since A is only collecting \$200 per month, it will go bankrupt.