Syllabus for Economics 30
Public Finance Fall 2013

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Classes: MW 15.30-17 PM
Office Hours: MW 13-14 PM
(and by appointment)

Course Description and Objective

This course investigates the role of government in the economy and aims at equipping students with tools sufficient to address a wide range of modern public policy issues. The emphasis is on microeconomic analysis of federal expenditure and taxation: the macroeconomic functions of the government are not addressed. We study the instruments by which governments intervene in the marketplace policies, and apply our tools to various real-life problems; social security, welfare spending and personal income taxation.

Prerequisites

The prerequisites for this course are Econ 1

Course Material

The required textbook for the course is:

Rosen, Harvey S. and Ted Gayer (2008), ***Public Finance***, McGraw-Hill/Irwin, 8th edition.
Recommended book: Atkinson, A.B., and J.E. Stiglitz (1987), ***Lectures on Public Economics*** (distributed chapters in class).
Recommended book: Stiglitz, J.E. (2000), ***Economics of the Public Sector.***

For background material, it may be useful to acquire an introductory and intermediate Microeconomics text.

Course Requirements and Grading

There will be several homework assignments, a midterm and a final exam. Exams will be closed book. The date of the midterm will be announced in class. The final exam will be announced later. I encourage you to prepare the homework assignments I groups of 3-4 students. The weighting for the final grade is 50% for the final and 50% for the midterm. Make-up classes and review sessions will be held and will be announced in advance in class.

Course Outline and Suggested Readings

- Overview of Economic Activities of Government
  Stiglitz, Chapters 1-2; R&G*, Chapters 1-2.

- Review: Pareto Optimum Conditions: In Production and Consumption

- Production Possibilities Frontier. Stiglitz, pp. 67-73, R&G, Chapter 3.

- Utility Possibilities Frontier
  Intermediate Microeconomic textbook and R&G, Chapter 3.

- Social Welfare Functions (Efficiency vs. Equality): Lecture 11 in Atkinson and Stiglitz (to be distributed in class): R&G, Chapter 12.

- Externalities in Consumption and Production, R&G, Chapter 5.

- Public Goods – R&G, Chapter 4; Atkinson and Stiglitz, Chapter 15, pp. 505-518.

- Taxation: Tax Incidence – Stiglitz, Chapters 17-19.

- Issues on Optimal Taxations – R&G, Chapter 14-16.

- Personal Income Tax and its Economic Implications – Stiglitz, Chapter 22; R&G, Chapters 17-18.

*Please note: All references to the text, Rosen & Gayer, will be referred to as R&G.

EXERCISE 1

Question 1

Robinson Crusoe has the following utility function: $U = X + Y$. where X and Y are products he consumes.

He has a total of 64 available work hours per week, $(\bar{L} = 64)$.

His production function for X is as follows: $X = L_X^{0.5}$.

His production function for Y is as follows: $Y = 4L_Y^{0.5}$.

a) Find the Production Possibility Frontier for X and Y and draw it precisely.

b) Find the equilibrium values of L_x, L_y X, Y and U.

c) Explain in words the Pareto Optimum conditions you have found at equilibrium.

d) How will you answer to (a) and (b), change if there is a technological improvement in the production function of X whereby production increases fourfold for every level of L?

e) How will you answer to (b) if Robinson Crusoe has a new utility function: U=X·Y

Question 2

An economy produces two products X and Y , which are produced using two production factors. K (capital) and L (labor). The quantities of these factors are: L_0 = 160000, K_0 = 10000. The production functions are: $X = L_x^{1/4} K_x^{1/4}, Y = L_y^{1/4} K_y^{1/4}$.

X and Y are traded in the international market and the international price is fixed:

$P_X = P_Y = 10{,}000$. It is known that in the economy there is competition in all sectors.

a) Find and draw the contract curve.

b) Find the Production Possibility Frontier of the economy.

c) Find the quantities of X and Y that afford maximum income (welfare).

<u>Question 3</u>

A closed economy produces two products: Private Services X and plastic goods Y using production factors of limited quantity. Capital, K_0 = 144 and Labor L_0= 36. The production functions are: $Y = L_Y^{0.5} K_Y^{0.5}$ and $X = L_X^{0.5} K_X^{0.5}$ The consumers' utility from the products is given by the following function: $U = X^2 Y$.

a) Draw the Edgeworth Box, the contract curve and the appropriate allocation of production factors. What is the consumer's utility level?

b) In the coming year the capital is expected to increase by 50%. The economy must continue to produce the same quantity of plastic goods as in (a) above. Find L_X, K_X expected in the coming year. What will the consumers' utility be after the increase in the amount of capital?

EXERCISE 2

Question1

An economy produces two products X and Y using the following production functions: and $X = L_X^{0.5} K_X^{0.5}$, $Y = L_Y^{0.5} K_Y^{0.5}$. The economy has 16 units of the production factor L (labor) and 144 units of the production factor K (capital).

a) Find the mathematical form and draw the graph of the production possibility frontier.

b) The economy has two consumers with the following utility functions: $U_1 = X_Y^{0.5} Y_Y^{0.5}, U_2 = X_2^{0.8} Y_2^{0.2}$.Find the Utility Possibility Frontier.

c) How will the economy optimally allocate the production factors and the products according to the Utilitarian Approach $(U_1 + U_2)$?

d) How will the economy optimally allocate the production factors and the products according to the Egalitarian Approach of Rawls $W = (Min\ (U_1 \cdot U_2))$?

e) How will the economy optimally allocate the production factors and the products according to the Social Welfare Function $W = U_1 \cdot U_2$?

f) How will your answers to sections (a) - (e) change if there is a technological improvement whereby a double amount of X can be produced from every combination of K_X and L_X.

Question 2

The following table includes various combinations of income (U) for Robinson Crusoe (U_1) and Man Friday (U_2). Draw the Utility Possibilities Frontier of their incomes and list the points on the graph by order of Social Welfare according to the following Social Welfare approaches:

a) Utilitarian
b) Rawls
c) $W = U_1 \cdot U_2$ (Nash)
d) Nozick for $\theta = 1$, and for $\theta = 2$
e) Extreme Equality $(\theta \to \infty)$

	A	B	C	D	E	F	G	H	I	J	K	L
U_1	3	3	4	5	6	8	7	6	5	4	3	1
U_2	0	5	4	8	8	12	20	32	50	56	60	60

Question3

A social planner claims that from the social point of view the two following allocations of wealth between two consumers are identical, i.e.,

$$W(U_1 = 110, U_2 = 120) = W(U_1 = 170, U_2 = 150)$$

a) Can this claim be accepted by the Utilitarian approach? By Rawls Approach? By intermediate approach $W = U_1 \cdot U_2$?

b) Can this approach be accepted by the Nozick approach? What is the θ and the level of W in this case? Given an accurate answer.

EXERCISE 3

Question1

In a lake, N fishermen operate N boats such that each fisherman has his own boat. The total amount of dear fish caught, Y, depends positively on the number of fishermen in the lake and is determined according to the production function of Y lb of fish per hour $Y = 400N^2$. The cost of operating a boat is $40 per hour. The price of 1 lb of fish is $1000.

a) Find the number of boats and fishermen that will operate under competitive equilibrium conditions.

b) An economist suggests limiting the entrance to the lake in order to improve the competitive equilibrium solution. Why? What is the optimal N?

c) What is the fee that will improve the solution, and leads to Pareto Optimum?

d) How will your answers to a) and b) change if the new cost of operation all the boats is $TC(N) = 80 \cdot N^2$?

Question 2

An economy produces honey, H, and avocado, A.

The honey producers' cost function is:

$$TC_H(H) = \frac{H^2}{100} + 40A$$

The avocado producers' cost function is:

$$TC_A = \frac{A^2}{150} - 10H$$

The honey and avocado are sold at fixed international prices, where $P_H = 80$ and $P_A = 80$.

a) When the market is competitive, how much honey and avocado will be produced? What will the income, costs, and profit of the honey and avocado producers be?

b) What are the Pareto Optimum amounts of avocado and honey and how will they be produced when producers operate when cooperating? What will their income, costs and profits be?

c) What subsidy and/or tax per unit of A and H should be set by the government in order to ensure Pareto Optimum production if each producer doesn't cooperate?

<u>Question 3</u>

Give one example of externalities in each of the following cases:

a) Positive externalities in consumption.

b) Positive externalities in production.

c) Negative externalities in consumption.

d) Negative externalities in production.

Do you think that in all of the above cases there is need for government intervention that corrects the inefficiency in equilibrium obtained by the market? Your answer, including the examples should not exceed 15 lines.

EXERCISE 4

Question1

a) Micronesia has 1000 inhabitants with identical incomes and tastes. Each inhabitant has a demand for *G* television hours as a function of the price *P* which is paid according to the equation: $G=30-0.1P$, where *P* is measured in dollar terms. The cost of supplying an hour of television broadcasting equals $30,000. How many hours of television broadcasting will there be in Micronesia and what is the free paid by each inhabitant?

b) 500 new immigrants join the country. They have identical incomes and tastes, which differ from those of the original inhabitants. Each new immigrant has the following demand function: $G=100-0.5P$. How will your answer to (a) change?

Question 2

An economy produces a private good *C* which is divided between a father (1) and son (2) and a public good *G* which is jointly consumer by them. A unit of *C* is produced using one unit of capital and a unit of *G* is produced using two units of capital. The economy has 1000 units of capital.

a) How many units of *C* and *G* will be produced and how many units of capital will be allocated to the production of each good?
b) How will the private product *C* be divided between C_1 and C_2?
c) What Pareto Optimum condition that must hold in equilibrium? Does this condition hold in your answer?

Question 3

An economy has two consumers who have identical incomes and tastes with respect to the private consumption of *C*, and a public good *G*. Each consumer has $1500. The utility of the first consumer is: $U_1 = C_1^2 \cdot G$. The utility of the second consumer is: $U_2 = C_2^2 \cdot G$. The price of the public good is $P_G=4$ and C_2 is measured in terms of dollar expense.

a) What is the Nash equilibrium without cooperation?

b) What is the Lindhal equilibrium with cooperation?

c) Compare the solution between a) and b).

d) Assume that cooperation between the individuals cost each of them $200. Would they prefer to cooperate under the new conditions?

e) (Optional) What is the solution to a) (Nash Equilibrium) if individual 1 has to pay $200 to individual 2? Who gains and who loses from it? What do you learn from your results regarding the question of inequality in income and utility?

EXERCISE 5

Question 1

"Proportional taxes and per capita taxes, which afford an equal sum of real taxes, per capita tax is always preferable". True/False

Question 2

"Progressive taxes and per capita tax which afford an equal sum of real tax, per capita tax is preferable". True/False

Question 3

"Progressive taxes may be preferable to proportional taxes which affords an equal sum of tax. However in this case there is always an alternative proportional tax which also affords an equal sum of tax and is preferable to the progressive tax." True/False

Answer these three questions using the Consumption Leisure model.

Question 4

A consumer has utility from consumption, C, and leisure, l, as follows:

$U = C^2 \cdot l$. The consumer has 24 hours per day, which he allocates to leisure, l, or work. L. The consumer earns W dollars per hour of work as well as a daily national insurance grant of $V = \$300$.

a) Find and draw the consumers labor supply curve (namely, L, as a function of W).

b) If the consumer is exempt from paying taxes, how many hours will he work? How much will he consume and what utility level will he achieve when $\overline{W} = 50$?

c) Now there is a tax on income from work only, $0<t<l$. The total amount of tax collected is: $T = t \cdot W \cdot L$. Show the Laffer curve $(T=f(t))$. What tax level, t, affords maximum income from taxes, T_0 (remember that $\overline{W} = 50$)? What will the amount of taxes collected, T_0, equal? What will the consumer's utility level be?

d) The government decides to collect the same amount of taxes, T_0, by imposing the tax on V and not on income from work. What will the consumer's utility be in this case?

e) What conclusion can be reached about the efficiency of taxes by comparing the utility of the consumer in section (b) and (c)

Question 5

A consumer has demand for alcohol, X, and cigarettes, Y as follows:

P_X, $= 220 - X$, $P_Y = 180 - Y$. P_X, P_Y are the prices of alcohol and cigarettes respectively. The marginal cost of producing these two products are:

$MC_X = 70$ and $MC_Y = 80$.

a) What is the tax level per unit of product, T_X, that will maximize the government's income from taxes? What will the income from taxes be? What will the Deadweight Loss be?

b) If the government needs an income from taxes that equals 1800, what taxes per unit, t_X and t_Y, will minimize the Deadweight Loss? What will be the proportion of deadweight less be relative to the tax collected from each product?

c) How will your answer to (b) change if you know that the consumption of a unit of Y and the consumption of a unit of X create damage to society worth $30?