Course Manual
Public Economics (SSC 2052)

December 5, 2017

1 Position in the Curriculum, Prerequisites and Aims

Public Economics considers the role of the government in the economy. We will study how the government intervenes in markets and consider the formulation, execution and impact of government policy. The government differs from other organizations because it can use legal instruments to enact policies and may have different goals to other actors in the economy. Arguments may arise for when government intervention is warranted and whether such intervention is beneficial.

We will study situations where govermental intervention arises such as incomplete information, public goods, externalities, environmental protection and inequality. These issues will be analysed from a normative (welfare economic) as well as from a positive (explanatory) perspective. After the course, you should be able to critically assess economic discussions pertaining to the public sector.

Students who enroll in this course should have knowledge and understanding of mathematics and microeconomics (in particular game theory, industrial organization, general equilibrium theory), at a level comparable to the second year economics course microeconomics. Exchange students need economics as a major and an advanced level of English to enroll in this course.

In comparison with your first year courses, expect the gap between the lecture/the book and the tutorial exercises to widen. While you have received a lot of basic knowledge and "recipes" to solve exercises so far, it is a main goal of this course to teach you particular theories and then have you solve exercise in a more independent fashion. Clearly, this means that most of you will struggle with some of the exercises at first and you may need to seek out additional resources to answer the tutorial problems. Even if you are unable to solve all the tutorial problems, sitting down and trying to solve them to the best of your abilities provides an important methodological step in your development and understanding of Economics.

2 Course material

The main compulsory material for this course are:

1. The lecture slides and additional material which I post on the Student Portal.

The additional material contains the tutorial exercises taken from different books. It also includes the articles for the presentations:

1. Article on Global Warming:
    - Stern, N. (2013): The Structure of Economic Modeling of the Potential Impacts of Climate Change: Grafting Gross Underestimation of Risk onto Already Narrow Science Models, *Journal of Economic Literature*, 51, 838-859.
2. Article on Global Terrorism:
    - Sandler, T. (2005). Collective versus Unilateral Responses to Terrorism, *Public Choice*, 124, 75-93.
3. Article on Disasters and Insurance:
    - Kunreuther, H. (2006). Disaster Mitigation and Insurance: Learning from Katrina, *The ANNALS of the American Academy of Political and Social Science* Vol 604, Issue 1, pp. 208 - 227
4. Article on Media and Government Policy:
    - Eisensee and Stromberg (2007). News Droughts, news floods an d US disaster relief, *The Quarterly Journal of Economics*, 122 (2) 693-728.
5. Article on World Inequality:
    - Milanovic, Branko (2006). Global Income Inequality: What it is and Why it Matters?, DESA Working Paper No. 26.

Most of the material covered in the lectures can be supplemented by parts of the books below:

- Gruber, J. (2016). *Public Finance and Public Policy*, 5th edition, Worth publishers, New York.
- Hindricks, J. and Myles, G.D. (2013). *Intermediate Public Economics*, 2nd edition, The MIT Press, Cambridge (H&M).

These textbooks are not compulsory but are useful for gaining a better understanding of concepts before starting work on tutorial exercises, revision before the final exam and as a source of additional practice exercises. Earlier editions of the textbooks will be similarly useful. Recommended reading from the books will be listed in the syllabus, however purchase of the textbooks is not necessary.

3 Teaching

The course consists of 4 joint meetings (*lectures*) and 10 group meetings (*tutorials*).

3.1 Lectures

Lectures provide an introduction and overview to the different topics in this course. They are partially based on chapters in Gruber (2016). Therefore, it is important that you attend these lectures. Lecture notes will be posted on Student portal before or after each lecture.

3.2 Tutorials

Two different study methods will be used in the tutorial meetings: (i) problems, (ii) presentations and (iii) experiments. You are expected to actively participate in all of them. Participation also contributes to your final grade. Experiments will be conducted if there are a sufficient number of willing participants.

Each tutorial meeting will be led by a pair of students. The lead pair is responsible for managing the tutorial and explaining the answers to the problems. As the lead pair, you are responsible for ensuring that all tutorial members understand how to answer the problems by the end of the tutorial. Moreover, you will guide any presentation discussions and answer questions pertaining to the problem sets. In order to do this you should work together on the problem set prior to the tutorial. Each tutorial meeting will be assigned a lead pair in the first meeting.

3.2.1 Problems

Problems consist of both "real-world" economic issues and/or opinions of some (hypothetical or real) people on the issue and mathematical problems. For the qualitative problems, you are expected to have a structured discussion. While you do not need adhere to the exact PBL format, make sure that you understand (i) the precise definition of all words/phrases (ii) how to analyze the issue using economic theory (iii) whether the opinions expressed in the problem are correct. For the mathematical problems, you are expected to be able to solve and explain the reasoning behind the mathematical steps to solve the problems.

The tutorial problems are essential for understanding the material and passing the final exam. We recommend that you form small study groups to solve these problem sets. However, before you sit in the final exam, you must be able to solve these problems on your own. Tutorial meetings provide you with the opportunity to discuss the solutions but only insofar as time restrictions allow for it.

3.2.2 Presentations

Each presentation will be on one of the following 5 topics: *Global Warming*, *Global Terrorism*, *Disasters and Insurance*, *Media and Policy* and *World Inequality*. A presentation on a topic must thoroughly engage with the article on that topic listed on page 2. In addition, you should find more recent material on the topic and relate it to the article. For example, a presentation can include real world applications and examples of the theory that is discussed in the papers. The presentation should be interactive, i.e., you are expected to include the group in your presentation. Prior to beginning the presentation, let the audience know if you are happy to take questions throughout.

Table 1: Course schedule

Week	**Date**	**Meeting**	**Topics, Literature, Activities**	
1	07-02	L-01	*Markets, Government, Welfare Economics*	
			Lit.:	Gruber Chap 2
	08-02	M-01	*Markets, Government, Welfare Economics*	
			Lit.:	H&M Chap 2 (you can skip 2.5, 2.6.4, 2.7), 13.1, 13.2
			Disc.:	Exercises for Tutorial 1
2	21-02	L-02	*Externalities*	
			Lit.:	Gruber Chap 5, 6
	22-02	M-02	*Markets, Government, Welfare Economics*	
			Disc.:	Exercises for Tutorial 2
3	27-02	M-03	*Presentation, Externalities*	
			Pres.:	Global Warming (1 presentation, max. 3 students)
			Disc.:	Exercises for Tutorial 3
	28-02	L-03	*Public Goods*	
			Lit.:	Gruber Chapter 7
	01-03	M-04	*Externalities*	
			Disc.:	Exercises for Tutorial 4
4	06-03	M-05	*Presentation, Public goods*	
			Pres.:	Global Terrorism (1 presentation, max. 3 students)
			Disc.:	Exercises for Tutorial 5
	07-03	L-04	*Social Insurance and Taxation*	
			Lit. (social insurance)	Gruber Chapter 12, 14, 15
			Lit. (taxation)	Gruber Chapter 19, 20
	08-03	M-06	*Public goods*	
			Disc.:	Exercises for Tutorial 6
5	13-03	M-07	*Presentation, Social Insurance*	
			Pres.:	Disasters and Insurance (1 presentation, max. 3 students)
			Disc.:	Exercises for Tutorial 7
	15-03	M-08	*Presentation, Taxation*	
			Pres.:	Media and Government Policy (1 presentation, max. 3 students)
			Disc.:	Exercises for Tutorial 8
6	20-03	M-09	*Presentation, Income Distribution*	
			Pres.:	World Inequality (1 presentation, max. 3 students)
			Disc.:	Exercises for Tutorial 9
	22-03	M-10	*Public Economics*	
			Disc:	Question Hour
			Note:	Questions must be sent in advance to the tutor.
7	28-03	Exam	*Public Economics*	

Two/three students will be jointly responsible for presentations on each topic. The number of students presenting each topic will be determined according to the size of each tutorial group. Thus, each student must give a presentation.

A presentation must give a clear picture of what the article on the topic is about: its main questions, its main answers, and a critical evaluation of the article. Moreover, the presentation should include more recent material on the topic (for example journal articles, surveys, newspaper articles) and link it to the presentation. A presentation should be between 30 and 40 minutes long. Timeliness is important and an inability to stay within this time limit will negatively impact grading.

After each presentation, a group discussion about the content of the article will take place. The discussion leaders will guide the discussion and are responsible for ensuring that the discussion takes place in a structured way. To stimulate the discussion, each student (apart from the presenters) should bring a short 1 page statement to the presentation. Such statements may challenge claims put forward, provide a substaintiated opinion on the article, extend on the contents of the articles, but may also be questions that are left open. If the discussion is inadequate the discussion leader may call upon a student to read their statement.

4 Assessment Methods

The course will be graded by a final exam (60%), presentation (20%) and participation (20%). **You need a final grade of at least 5.5 and an exam grade of at least 5.0 to pass the course.**

4.1 Final Exam

The final exam is a closed book exam. There will be 4 open questions in the exam. You will have 2 hours to answer the questions. If you obtain at least 50% of the possible points, you are guaranteed to get a grade of at least 5.0 in the exam. The exam-relevant material consists of all material presented in the lectures and tutorials and covered chapters of Hindricks and Myles (2013), Gruber (2016). There will be no explicit questions about the articles for the presentations, but understanding them helps your general understanding of the topics covered in this course. **Solving the tutorial problems is necessary for a successful performance in the written exam**.

Consult the examinations website in Student Portal for the latest news on the date, time and location of the exam as well as the possible restrictions. Only non-programmable calculators will be allowed during the final exam.

If an (exchange) student wants to take part in the resit exam, he/she has to take the resit exam in Maastricht on the regular date. According to the rules of the university, there are NO EXCEPTIONS possible.

4.2 Presentation

The tutor will announce a clear and coherent way of grading in the first tutorial. The grade should mostly focus on the content, but also takes form and timing/length into account. **While**

a proper functioning of the group might contribute to a better general impression on your tutor, grades will be given on an individual level. Thus, make sure to divide the presentation in equal parts.

4.3 Participation

Participation will be graded on the basis of (i) the quantity and quality of your contributions to group discussions (ii) the quality of your contribution during the discussion of an article (iii) general conduct (respecting other group members, refraining from distracting conduct, punctuality, etc.) and (iv) preparation when leading discussions. Irrespective of your qualitative performance in tutorial meetings, you will fail the participation requirement if you miss more than 2 tutorial meetings. If you miss three or more tutorial meetings, you fail the course.

4.4 Participation in Earlier Courses

Grades for presentation and participation obtained in earlier years do not carry over to this course. If you have failed participation and presentation in a previous year (average grade below 5.5), you have to retake the entire course. If you have passed the participation and presentation requirements with a grade of at least 5.5 in a previous year (please send me an email with the year and your tutor in this case), you can take the exam without passing the participation/presentation requirement. If you choose this option, your final grade is equal to your exam grade. In any case, I advise you to attend the tutorials and lectures again.

5 Contact

My (Dr. Tse-Ling Teh) contact information is provided below. For questions regarding the lecture, students can contact me by email, or preferably directly after the lecture. Feel free to ask questions during the lecture, too. Questions about tutorial groups, tutorial exercises, presentations and old exam questions should be discussed with your tutor.
Coordinator: Dr. Tse-Ling Teh
Email: t.teh@maastrichtuniversity.nl
Office Hours: by appointment
Tutor: Anastas Tenev
Email: ap.tenev@maastrichtuniversity.nl
Office Hours: By appointment

Tutorial 1

Introduction Every student introduces himself including hobbies, study year and program and answers the questions: What do you associate with the public sector (in your country)? What do you expect from this course? Afterwards, appointment of the chairpersons for each meeting and the allocation of the articles for presentations takes place. The tutor announces his/her expectations and explains the way in which he/she grades participation and presentation.

Problems 1. In which of the following markets do you expect efficient outcomes? Why? (i) Hurricane insurance for beach houses; (ii) medical care; (iii) stock market; (iv) loans for students who wish to attend college. Discuss other reasons for government intervention in these markets.

2. Exercises 2.19, 2.20, 2.21 in H&M. How would you formalize the statements in the text? The answer might not always be unique.

3. Ana and Bob enjoy discussions on economics. They have had many heated debates on whether markets should be left to themselves. Ana is pro-market as she believes that left to themselves, markets lead to efficient outcomes. Bob, on the other hand, believes that markets can be both inefficient and inequitable and therefore supports government intervention. One day Bob was reading World Bank (2007)[1] in which he found the following information:

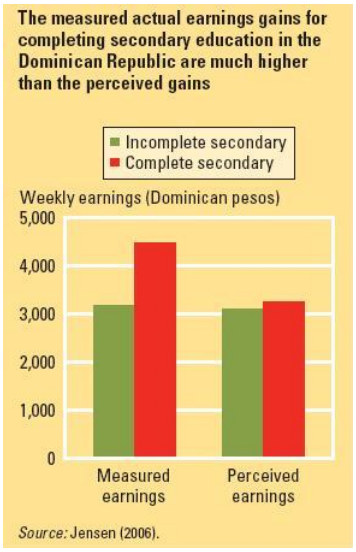

Figure 1: Source: World Bank (2007), p. 17

> "Do young boys know the value of schooling? Not always. In the Dominican Republic a survey of boys in 2001 enrolled in the final year of primary school compared the returns they perceived to continuing their education with the actual returns.... It found that they accurately estimated the returns to completing primary school (but not completing secondary school).... However, they severely underestimated the returns to completing secondary school. The measured actual average earnings gains (from surveys) between

[1] World Bank (2007). World Development Report 2007: Development and the Next Generation, The World Bank Washington DC.

> secondary and primary completion, at about 1,300 Dominican pesos (about $200), was 10 times the perceived gain of 140 Dominican pesos (about $21) (figure). The differences were most pronounced for the youth in the poorest households."
>
> World Bank (2007), p. 17

Excited, Bob immediately met Ana and said, "Here is an evidence that markets are inefficient!"

"This is not an example of markets being inefficient, rather the inefficiency is caused by the absence of a market. An efficient outcome can be obtained by allowing a firm to collect this information and sell it at a price," Ana responded.

"But that is not fair and so will not improve social welfare," Bob shot back.

Task: First describe the empirical findings. Why is the outcome inefficient? About which "good" does Ana speak when she attributes the inefficiency to the absence of a market? Is her suggestion realistic? Is Bob's last statement correct?

Tutorial 2

Problems

1. Ana and Bob consume bread and butter. Ana has an initial endowment of 60 slices of bread and 10 cubes of butter. Bob has an initial endowment of 20 slices of bread and 30 cubes of butter. Utility function for Ana is $U_A(s_A, c_A) = s_A + c_A$, where s_A is the number of slices of bread she consumes and c_A is the number of cubes of butter she consumes. Bob's utility function is $U_B(s_B, c_B) = s_B c_B$.

   (a) Draw an Edgeworth Box measuring Ana's consumption from the lower left and Bob's consumption from upper right corner of the box. Mark the initial endowment and label it E. Draw the indifference curves of Ana and Bob passing through the initial endowment E.

   (b) Draw the contract curve. What condition does a Pareto efficient allocation satisfy in this economy?

   (c) Suppose that the market prices for a slice of bread and a cube of butter are are p_s and p_c respectively. What are the budget lines for Ana and Bob?

   (d) What are the demand functions for Ana and Bob if the market prices are p_s and p_c? Notice that for any initial endowment, the demand functions are functions only of the price ratio.

   (e) Find the competitive equilibrium price and allocation.

   (f) Confirm that the competitive equilibrium allocation is Pareto efficient.

2. Answer Question 1 assuming that Ana's utility function is $U_A(s_A, c_A) = min\{s_A, c_A\}$and her initial endowment is 20 slices of bread and 10 cubes of butter.

3. Exercise 13.14 a, b in H&M.

4. (Taken from the 2012/13 exam) Consider an economy with three consumers, Ana, Bob and Charles. They have a total of 100 $ to divide amongst themselves. Denote by x the amount Ana gets, by y the amount Bob receives and by z the amount Charles receives. The utilities are given by $U_{Ana} = xy$, $U_{Bob} = xy + y$ and $U_{Charles} = (x + y)(50 + z)$. Which division maximizes the Rawlsian Social Welfare function?

Tutorial 3

Presentation on Global Warming (50')

- 1 presentation for max. 40 mins. by 2 or 3 students.
- After the presentation, group discussion for 10 mins. (i) along the lines of posed statements, (ii) about open issues concerning the article.

Problems

1. (Based on the Final Exam 13/14) Sheldon (S) and Penny (P) share a flat. Each of them has 1500 $. Both of their utility functions depend on the amount of music (m) played in the flat. Music is a public good and has production costs of zero for any amount. In addition, Sheldon's utility is increasing in the amount of comic heroes (h) which he can buy, while Penny's utility is increasing in the number of shoes (s) which she can buy. The utility functions are $U_P(s, m) = s + 15m - \frac{1}{2}m^2$ and $U_S(h, m) = h - m^2$. Both comic heroes and shoes can be bought at a price of one per unit. By a roommate agreement, Sheldon can decide on the amount of music in the flat. What is the efficient amount of music? What is the minimal amount of money that Sheldon is willing to accept to allow Penny to play music at the efficient amount? What is the maximum that Penny might be willing to pay to play music at the efficient amount?
2. Exercise 8.9 a,b,c in H&M.
3. Taken from Rosen & Gayer (2009) (p. 107): "Suppose that two firms emit a certain pollutant. The marginal cost of reducing pollution for each firm is as follows: $MC_1 = 300e_1$ and $MC_2 = 100e_2$, where e_1 and e_2 are the amounts (in tons) of emissions reduced by the first and second firms, respectively. Assume that in the absence of government intervention, Firm 1 generates 100 units of emissions and Firm 2 generates 80 units of emissions.

   a. Suppose regulators decide to reduce total pollution by 40 units. In order to be cost effective, how much should each firm cut its pollution.

   b. What emissions fee should be imposed to achieve the cost-effective outcome? How much would each firm pay in taxes?

   c. Suppose that instead of an emissions fee, the regulatory agency introduces a tradable permit system and issues 140 permits, each of which allows the emissions of one ton of pollution. Firm 1 uses it political influence to convince the regulatory agency to issue 100 permits to itself and only 40 permits to Firm 2. How many, if any, permits

are traded between the firms? What is the minimum amount of money that must be paid (total) for these permits? By how many tons does each firm end up reducing its pollution?"

Tutorial 4

Problems

1. Positive externality:

   (a) Explain with the help of a graph and also verbally what is the economic implication of the presence of a positive externality.

   (b) What is the efficiency condition in the presence of a positive externality?

2. Exercise 8.7 a,b,c in H&M

3. Consider the following situation. A profit maximizing monopolist (firm 1) is producing steel, x, which effects the profit of a second firm (firm 2), a laundry, in a negative way. Firm 1 incurs costs when producing steel that are given by the total cost function $C(x) = a+bx^2 (a > 0, b > 0)$. The profit function of firm 1 is given by $\Pi_1 = p(x)x - C(x)$. The external costs imposed on firm 2 are given by $E(x) = kx^2 (k > 0)$ and the profit function of firm 2 is then just $\Pi_2 = d - E(x)$ $(d > 0)$. The demand function firm 1 is facing is given by $p(x) = 1 - x$.

   (a) Calculate and compare the output produced by firm 1 with the socially efficient output. Is there a value k for which the monopolist produces the socially efficient output? Explain the result.

   (b) What is the Pigouvian tax that would induce firm 1 to produce efficiently?

   (c) What is the Pigouvian subsidy that would induce firm 1 to produce efficiently?

4. Ana and Bob are the only two fishermen in Lake Erie. If Ana and Bob spend f_a and f_b amount of time fishing respectively, then the total catch is $10(f_a + f_b)^{\frac{1}{2}}$ kilograms of fish. Share of Ana's catch in the total catch is $\frac{f_a}{f_a+f_b}$ while the share of Bob's catch in the total catch is $\frac{f_b}{f_a+f_b}$. A kilogram of fish fetches a price of \$4. It costs each Ana and Bob \$2 per unit of time to go fishing.

   (a) What is the total amount of time spent by Ana and Bob fishing in Lake Erie in the symmetric Nash equilibrium?

   (b) What amount of time spent fishing in Lake Erie maximizes social surplus – forget consumer's surplus?

   (c) Discuss various ways in which the efficient outcome can be attained?

5. Suppose that Ana and Bob of Question 4 are siblings who have decided to share the total catch equally. Thus, if Ana and Bob spend f_a and f_b amount of time fishing respectively, then the total catch is $10(f_a + f_b)^{\frac{1}{2}}$ kilograms of fish and both Ana and Bob divide the catch equally among themselves. What are your answers now to the three parts of Question 4, how do they change?

6. Please read the quote below.

> "England's smokers are about to be banned from lighting up in pubs, restaurants and offices.... The smoking ban is justified... using fancy-sounding economic arguments about the "externalities" of smoking.
>
> I like economic arguments as much as anyone, but in this case they do not point in quite the direction that most people seem to think. An"externality" seems a simple enough concept: it's a harm suffered or benefit enjoyed by some third party that isn't reflected in a market transaction. Pollution is the classic example. The idea is important, because even pro-market types believe that externalities are a market failure potentially justifying the government's involvement.
>
> Yet the only credible arguments for restricting smoking have nothing to do with economics. The damage caused by second-hand smoke in pubs is not an externality.... An "externality" is not just any old cost or benefit; it has to lie outside a market transaction.
>
> In the case of pubs and restaurants, the market could hardly be more obvious. The landlord wants to attract customers, both smokers and non-smokers, and he'll do that by giving them the ambience they want. At the same time, he also needs to attract staff, and since slavery has been illegal for a while in England, if the working conditions are unpleasant, he'll need to offer better pay to compensate.
>
> So far, the English pub remains a smoker's paradise. Far from being an argument for government regulation to fix an externality, it's evidence that the smokers value their freedom to smoke more than the staff and non-smokers value a smoke-free environment. Many of the people who grumble about smoky pubs wouldn't go to smoke-free pubs either, or smoke-free pubs would already exist.
>
> If non-smokers really felt strongly about second-hand smoke, these smoke-free pubs would attract flocks of high-paying non-smokers and staff would queue to work there even at lower wages. In practice, the "smoke-free" gap in the market has so far been filled by places such as Starbucks.
>
> The smoking ban is usually phrased as a ban on smoking in "enclosed public spaces". Of course, a restaurant or pub is not a public space: it's a private space in which the public gather. (If you think a restaurant is a public space, try bringing a picnic along to one.) The irony of the legislation is that it forces smokers into what genuinely are public spaces – the pavements outside restaurants and office buildings – and produces a small externality where previously none existed."
>
> Tim Harford (2007)[2]

Task: Is Harford right when he says "The damage caused by second-hand smoke in pubs is not an externality"? Link your answer to the definition of an externality. Is Harford right when he says that, by forcing people to smoke outside, the legislation causes "a small externality where previously none existed"? Do you think government should restrict smoking in public places?

[2]Tim Harford (2007). Undercover Economist: The true cost of smoking. In www.FT.com, June 22 2007.

Tutorial 5

Presentation on Global Terrorism (50')

- 1 presentation for max. 40 mins. by max. 3 students.
- After the presentation, group discussion for 10 mins. (i) along the lines of posed statements, (ii) about open issues concerning the article.

Problems

1. South-East Asia has been hit by a tsunami. UN is coordinating relief efforts. It announces that people can buy rice in the open market and send it to a central warehouse in New York from where it will be shipped.

   (a) From the perspective of the contributers, discuss whether relief provided to the victims is a public good or not.

   Suppose Ana and Bob are the only two potential relief providers in the US. Ana's gross payoff (not including the price per kg she has to pay) measured in dollars is $U_A = x_A + x_B$, where x_A and x_B are kilograms of rice sent to the warehouse in New York by Ana and Bob respectively. Bob's gross payoff in dollars is $U_B = (x_A + x_B)^{\frac{1}{2}}$. The market price for rice is \$2 per kg.

   (b) What level of relief maximizes the total social surplus of the US measured by the Additive Social Welfare Function – assume that the utility of the aid receivers is not a part of social surplus of the US?

   (c) What level of relief will be provided in Nash equilibrium?

   (d) How do your answers to parts (b) and (c) change if Ana's utility function is $U_A = 2(x_A + x_B) - (x_A + x_B)^2$.

2. Consider Question 1 with $U_A = (x_A + x_B)^{\frac{1}{2}}$ and $U_B = (x_A + x_B)^{\frac{1}{2}}$. Suppose the US government could force Ana and Bob to contribute x_A and x_B to the relief effort. What x_A and x_B should it choose to maximize social surplus?

3. Otopia has two citizens, Ara and Bub who care about the amount of bread they eat and the number of tanks that the Otopia's government produces for their national safety. Ara's utility function is $U_A = T^{\frac{1}{2}} + w_A$ and her income is \$100, where$T$ is the number of tanks produced by the Otopian government and w_A is the quantity of bread she eats. Bub's utility function is $U_B = 4T^{\frac{1}{2}} + w_B$ and his income is \$200. The price of bread is \$1 per unit. Cost of producing tanks is $C(T) = \frac{1}{16}T^{\frac{5}{2}}$. What is the efficient amount of tanks that the Otopian government should produce?

Tutorial 6

Problems

1. Exercise 6.10 H&M.

2. Exercise 6.11 H&M.

3. Consider the following game between four players. Each player i has an initial endowment of 25 units of money. This money can be split between a private account (x_i) and a public account (y_i). The payoff of each player consists of the amount she allocated to her private account plus $\frac{1}{2}$ of all contributions to the public account, i.e.,

$$u_i(x_i) = x_i + \frac{1}{2}\sum_{j=1}^{4} y_j. \tag{1}$$

   (a) Find the Nash equilibrium under the assumption that all participants are fully rational and only interested in their own earnings. Discuss how you arrived at the result.

   (b) If the social welfare function is additive, what is the social welfare maximizing outcome? Discuss how you arrived at the result.
   Is the outcome that maximizes social welfare Pareto efficient? If no, why not? If yes, are there other Pareto efficient outcomes?

   (c) What are the economic reasons that surplus maximization is not achieved? Link your answer to the definition of a public good.

   (d) Discuss some political measures that would ensure (or at least make it more likely) that surplus maximization is achieved.

4. Consider two economic agents $i = 1, 2$ with utility functions $U_i = a_i \ln G + x_i$ and income m_i. G is a public good and x_i is a private good. Normalize the price of the private good to 1 and let p_i be the "price" agent i is willing to pay for the public good. The budget constraint is then given by $m_i = p_i G + x_i$.

   (a) Find the MRS's between the public good and the private good.

   (b) Find the individual demand functions for the public and the private good.

   (c) Let $a_1 = 1/4$ and $a_2 = 3/4$ and suppose that the marginal cost of supplying G is given by $G/4$. What is the efficient amount of the public good?

Experiment

1. A classroom experiment is conducted in the last 15 minutes of the tutorial. You do not need to prepare anything for that part.

Tutorial 7

Presentation on Disasters and Insurance (50')

- 1 presentation for max. 40 mins. by max. 3 students.
- After the presentation, group discussion for 10 mins. (i) along the lines of posed statements, (ii) about open issues concerning the article.

Problems

1. Exercise 12 in Gruber chap 12 (p362).
2. Exercise 16 in Gruber chap 12 (p363).
3. Unemployment Insurance: Individuals have utility function given by $U(C) = \sqrt{C}$. Individuals earn a wage w when employed and have no earnings when unemployed. The probability of being unemployed is p.

   (a) What is the individual's expected utility?

   (b) How much insurance at an actuarially fair price would individuals buy?

   (c) Graph the previous result, labelling axes and showing the risk premium.

   (d) When individuals have their own private probability of being unemployed p_i (unobservable to private insurers and to the government). Explain how the government might intervene in the insurance market. Explain why.

   Now assume the government intervenes and provides unemployment insurance benefits b to the unemployed. This is financed by a payroll tax t paid by the employed.

   (e) What is the government's constraint for a balanced budget and individual's expected utility as a function of p, w and b.

   (f) When the likelihood of being unemployed depends positively on the generosity of unemployment benefits b, should the government provide full or partial insurance? Explain.

4. Consider an economy that is composed of identical individuals who live for up to two periods. These individuals have preferences over consumption in period 1 and 2 given by $U = ln(C_1) + ln(C_2)$.They receive an income of 40 in period one and 22 in period two. They can save as much of their income in bank accounts, earning an interest rate r of 10% per period. They do not care about their children so they spend all their money before the end of period two. Each individual's budget constraint is $C_1 + C_2/(1+r) = Y_1 + Y_2/(1+r)$. Individuals choose consumption in each period by maximising lifetime utility subject to this lifetime budget.

   (a) What is the individual's optimal consumption each period? How much saving do they save in the first period?

   (b) Now the government decides to set up a social security system. This system will take \$10 from each individual in the first period and put it in the bank and transfer it to him or her with interest in the second period. How does this effect private savings?

(c) Suppose the government uses the $10 contribution from each individual to start paying out benefits to current retirees (who did not pay in to a social security system when they were working). It still promises to pay current workers $10 (plus interest) back when they retire using contributions from future workers. What is the problem with this system?

Experiment

1. A classroom experiment is conducted in the last 15 minutes of the tutorial. You do not need to prepare anything for that part.

Tutorial 8

Presentation on Media and Policy (50')

- 1 presentation for max. 40 mins. by max. 3 students.
- After the presentation, group discussion for 10 mins. (i) along the lines of posed statements, (ii) about open issues concerning the article.

Problems

1. Consider the following model for sandwiches. Suppose the aggregate demand for sandwiches is $Q^D = 900 - P/2$ where P is the price of a sandwich and Q is the qantitity of sandwiches demanded in terms of thousands of sandwiches. The aggregate supply is $Q^S = P/4$.

   (a) Draw the market equilibrium.

   (b) What are the equilibrium price and quantity?

   (c) Derive the price elasticity of demand at equilibrium.

   Now suppose a tax of $t = 60$ is imposed on each sandwich that is purchased.

   (d) Draw the market equilibrium.

   (e) What are the equilibrium price and quantity?

   (f) Compute and graphically show the deadweight loss due to the tax.

   (g) What is the incidence of the tax? Explain the key factors for determining the incidence.

2. Discuss the following questions based upon your reading of the book chapters (for some questions, you might need to look for additional material). Moreover, find examples for the different taxes in real-world taxation:

- Why do we need a tax system?
- What are desirable features of a tax system?

- What are progressive, proportional, and regressive taxes?
- What is the difference between statutory incidence and economic incidence?
- What is the difference between ad-valorem taxes, unit taxes, and profit taxes?

3. Discuss the following two questions:

On January 1, 2003, the German government introduced a can deposit, i.e., consumers have to pay an extra amount for each can or bottle they buy (between 8 and 25 cents), which is refunded if the can or bottle is brought back (empty). The main goal of the deposit was to increase the number of recycled cans. Ten years after the introduction, many rich people still throw their cans in the trash. Some poorer people collect the cans and thereby collect the can deposit. Do you think this side effect is a socially desirable way of income redistribution?

Which goods should be taxed at a high rate if the government (1) wants to redistribute income from the rich to the poor and (2) wants to avoid large deadweight losses through the tax? Compare your answers to the actual tax schemes in your home country.

Tutorial 9

Presentation on World Inequality (50')

- 1 presentation for max. 40 mins. by max. 3 students.
- After the presentation, group discussion for 10 mins. (i) along the lines of posed statements, (ii) about open issues concerning the article.

Problems

1. Two friends, Rebecca and Paula discuss how to allocate the money (200 Euros) which they received for a joint project. Their preferences are given by $u_R(m_R) = \sqrt{m_R}$ and $u_P(m_R, m_P) = \sqrt{m_P} + 0.8\sqrt{m_R}$. Which distribution maximizes the Utilitarian Social Welfare function? Why are not all distributions Pareto efficient? Find the set of Pareto efficient distributions.
2. Exercise 14.6 a,b in H&M, calculate the Gini coefficient.
3. This question uses material from the article of Bourguignon and Morrisson (2002). Suppose there are four persons living in a (very small) hypothetical country. In this country, one person earns 40.000 euro per year, another earns 25.000 euro, another earns 20.000 euro while yet another earns only 15.000 per year. Draw the *Lorenz-curve* and compute the *Gini-coefficient*.

   Now suppose the government decides to redistribute 10.000 euro from the richest to the poorest person. Again compute the Gini coefficient for our hypothetical country.
4. The Lorenz curve of an economy is given by $L(x) = \frac{2}{5}x + \frac{3}{5}x^2$. Compute the Gini coefficient.

Tutorial 10

Question Hour

- Open Questions can be addressed. Please send any open question to your tutor until Tuesday before the tutorial.