

Prelim Microeconomics

Tutors:

John Menzies

john.menzies@economics.ox.ac.uk

<http://www.johnmenzies.ca>

Ben Poster

posterben@gmail.com

Some ground rules

The objective of our tutorials is to introduce you to the scope and purpose of current microeconomic analysis and provide you with the basic tools required to understand later courses. Additionally, we will examine how these tools can be applied to microeconomic policy issues.

By the end of this course, you should be able to understand and clearly explain the tools, use the tools to analyse simple problems, and discuss the methodology.

We will meet 13 times this term for maths and economics tutorials (details below - we will almost certainly have 2 more tutorials next term).

In general, there will be two tutorials per week: on Monday you will have a maths tutorial where you will go through technical problems. On Thursdays, you will have an essay-based tutorial where you will discuss an essay prepared earlier in the week.

For all tutorials, you will complete the work and submit it by the posted deadline. Please type the essays but do not omit diagrams or mathematical notation. Neatly draw diagrams by hand and do *not* paste them from the textbooks. To insert them into your essay, either scan them, take a photo of your diagram with your phone, or create your diagram in PowerPoint (or a similar software).

Maths work must be handed in to the porter at Keble lodge. Essays should be emailed to the relevant tutor. Work must be submitted by the posted deadline *otherwise it will not be marked and you will be barred from the subsequent tutorial*. If your work is not satisfactory or handed in on time, we are obliged to bring this to the Senior Tutor's attention. Please start working on your assignments well before the deadline. Part of what you will develop this term is the ability to manage your time.

We will automatically grant a 1-day extension as long as it is requested earlier than the day before the deadline. That is, we will not grant extensions on Monday if the assignment is due on Tuesday; you would need to request one at least on Sunday. If you request an extension, we cannot guarantee that your work will be marked by the tutorial.

All of your work must be clear and well-presented. In general, your approach to economics questions and maths problems should be to go beyond the minimum required by the question, providing relevant comments, interpretation and explanation for your answers.

Every week, in addition to completing your assigned work, you should read the appropriate chapters from the textbooks and take notes. We won't have time in the tutorials to cover everything you need to know. It is your responsibility to ensure that you cover everything. If there are any particular points in the lectures or readings that you don't understand, please ask us to explain. If possible, email before the tutorial with anything you are having trouble with.

We expect you to attend *all* lectures given for your courses. Our tutorials will be strongly related to what is covered by the course lecturers. The Economics Department Lecture List gives times and places for all lectures. This can be found on the [Economics Department WebLearn page](#) together with further information about the course and the examinations (course descriptions, lecture notes, and links to past exam papers).

The different languages of economics

David Friedman, in his textbook *Price Theory: An Intermediate Text*, notes that economists primarily use three languages to communicate and reason:

There are several different languages in which the problem of consumer behavior—and many other problems in economics—can be analyzed. Each of these languages has advantages and disadvantages. One may use the language of calculus, making assumptions about the form of the “utility function” that describes the individual's preferences among different goods and deducing the characteristics of the bundle of goods that maximizes it. This has the advantage of allowing compact and rigorous mathematical arguments

and of producing very general results, applicable to a wide range of possible situations. It has the disadvantage that even if you know calculus, you probably do not know it in the same sense in which you know English. Unless you are very good at intuiting mathematics, you can follow a proof step by step from assumptions to conclusions and still not know why the result is true. ...

Another possible language is geometry. Most of us can understand abstract relations better as pictures than as equations; hence geometric arguments are easier to intuit. One disadvantage of geometry is that it limits us to situations that can be drawn in two dimensions – typically, for example, to choices involving only two different goods. A second disadvantage is that we may, in drawing the picture, inadvertently build into it assumptions about the problem – possibly false ones.

The third language is English. While not as good as mathematical languages for expressing precise quantitative relations, English has the advantage of being, for most of us, our native tongue. Insofar as we think in words at all, it is the language we are used to thinking in. Unless we have very good mathematical intuition, all mathematical arguments eventually get translated, in our heads, into words, and it is only then that we really understand them. Alfred Marshall, possibly the most important economist of the past century, wrote that economic ideas should be worked out and proved in mathematical form and then translated into words; if you find that you cannot put your analysis into words, you should burn your mathematics.

Much of Prelim Microeconomics is ensuring the you understand the different languages of economics. For most of you, mathematics and translating mathematics into English will be the most difficult.

Mathematics

There are ten weeks of lectures: two per week throughout Michaelmas Term and the first two weeks of Hilary Term. It is very important that you attend the lectures by Professor Ian Crawford, which take place on Mondays and Tuesdays at 11am in the Examination Schools.¹ If you have not done mathematics to at least AS-level, you should also attend the lecture course Elementary Mathematical Methods (Thursdays at 2 pm in the Manor Road Building (Rooms D, F and the IT room) , and Fridays at 11 am in Seminar Room C, Manor Road) given by Dr Emma Howard and Dr Andrew Mell.

For the mathematics component of the course, we will be working from the [Maths Workbook](#). You can find it on the Department of Economics intranet. For more resources on

¹Please double-check these times and locations – they are subject to change.

mathematics, you might want to consider Ian Jacques' *Mathematics for Economics and Business* or Anthony and Biggs' *Mathematics for Economics and Finance*.

You will meet with John Menzies in weeks 1-6 to work through mathematics and economics problems.

Essays

Many freshers have significant trouble producing high-quality essays. This is another area that we will focus on this term. When producing an essay, remember George Orwell's 'six elementary rules' from his essay *Politics and the English Language*:

1. Never use a metaphor, simile, or other figure of speech which you are used to seeing in print.
2. Never use a long word where a short one will do.
3. If it is possible to cut a word out, always cut it out.
4. Never use the passive where you can use the active.
5. Never use a foreign phrase, a scientific word, or a jargon word if you can think of an everyday English equivalent.
6. Break any of these rules sooner than say anything outright barbarous.

If you would like more information on clear writing, please see [*The Economist Style Guide*](#).

Your essays *must* answer the question posed in the prompt. The prompt will almost certainly relate to something covered in either the readings or the lectures. Please attempt to use the readings in your essays: don't simply regurgitate the text but apply the theory to the problem at hand.

You will meet with Ben Poster in weeks 2-6 to discuss your essays.

Texts

The course material provided by the department notes that the introductory texts for the lectures are:

- **BVFD**: Begg, Vernasca, Fischer and Dornbusch *Economics* (10th ed, 2011)
- **LC**: Lipsey and Chrystal, *Economics* (11th ed, 2007)

Other books they recommend include:

- **F**: R. H. Frank *Microeconomics and Behaviour* (8th ed, 2010)
- **MKR**: Katz and Rosen, *Microeconomics* (3rd ed,1998; European edition is also appropriate)
- **P**: Perloff, *Microeconomics with calculus*
- **V**: Varian, *Intermediate Microeconomics: A Modern Approach*

MKR is about the right level for most of the course, but doesn't have a sufficiently detailed introductory section for Demand and Supply; for this, the introductory textbooks provide good first reading, and **P** gives more depth. **F** is a substitute for **MKR**, with good examples and applications.

P is particularly useful for demand and supply, and for examples on partial equilibrium welfare analysis. There are two versions. The one with calculus presumes that you know calculus. The other one (*Microeconomics*) does a similar job without calculus.

V is thorough, but somewhat abstract in approach. You should use at least one other textbook for alternative explanation, examples and discussion. The latest version is the 9th Edition (2014). Earlier editions are fine as well, though the chapter numbers change a little (there is a new Chapter 17). The chapters below refer to the 9th edition. Varian also has a new book called *Intermediate Microeconomics with calculus*. This is the same as the 9th edition of *Intermediate Microeconomics* but includes the calculus material that is otherwise in appendices in the text itself.

For students who wish to see more advanced material, you might want to look at:

- Kreps, D., *A Course in Microeconomic Theory*
- Varian, H.R., *Microeconomic Analysis*

Please feel free to contact us by email if you have any questions.

Additional material

We strongly encourage you to listen and read about economics in your spare time. There are many excellent online resources where you can listen to and read interesting economic analysis. Please remember, however, that reading blogs and listening to podcasts is a complement to (not a substitute for) your tutorial readings. Here are some good places to start:

[NPR Planet Money podcast](#)
[The Marginal Revolution blog](#)
[The Becker-Posner blog](#)
[The Freakonomics blog](#)

Greg Mankiw's blog
A Worthwhile Canadian Initiative blog
Brad Delong's blog
EconLog blog
VoxEU

For more blogs, have a look at [this ranking](#).

Week	Lecture Topic	Tutorial topic	Math Tutorial	Essay Tutorial
MT1	Supply and Demand I	Introduction		Thursday <i>Rm 2902</i>
MT2	Supply and Demand II	Supply and Demand	Monday <i>Rm 2902</i>	Thursday <i>Roy Griffiths</i>
MT3	Firms I	Supply and Demand	Monday <i>Rm 2902</i>	Thursday <i>Roy Griffiths</i>
MT4	Firms II	Production, costs, and factor demand	Monday <i>Rm 2902</i>	Thursday <i>Roy Griffiths</i>
MT5	Firms III	Competition and monopoly	Monday <i>Rm 2902</i>	Thursday <i>Roy Griffiths</i>
MT6	Consumers I	Imperfect competition	Monday <i>Rm 2902</i>	Thursday <i>Roy Griffiths</i>
MT7	Consumers II	Preferences, constraints, demand		Thursday <i>Rm 2902</i>
MT8	Consumers III	Income and substitution effects		Thursday <i>Rm 2902</i>
HT0	Market failures I	Perfect and imperfect competition		TBD <i>Rm 2902</i>
HT1	Market failures II	Perfect and imperfect competition		TBD <i>Rm 2902</i>

NB– Room 2902 is located above the porter’s lodge.

If you have a conflict with your tutorial times, first try to swap groups with another student. If that is not possible or there is a general conflict, email John Menzies (john.menzies@economics.ox.ac.uk) ASAP.

Group	Time	Members
1	Weeks 1-8: Thursday 10am-11am Weeks 2-6: Monday 2pm-3pm	
2	Weeks 1-8: Thursday 11am - noon Weeks 2-6: Monday 3pm-4pm	
3	Weeks 1-8: Thursday noon - 1pm Weeks 2-6: Monday 4pm-5pm	
4	Weeks 1-8: Thursday 2pm - 3pm Weeks 2-6: Monday 5pm-6pm	
5	Weeks 1-8: Thursday 3pm - 4pm Weeks 2-6: Monday 6pm-7pm	

Week 1: Introductory tutorial

Tutorial date: Thursday, 16 October

Work due at Keble Lodge on Wednesday, 15 October by 7pm

Textbook reading and questions

Varian Chapter 1; Begg, Vernasca, Fischer and Dornbusch 3,4; Lipsey and Chrystal 3,4; Perloff 2; or Frank 2. [Do not read *all* of these chapters, choose one text and read the listed chapters]

For discussion

In addition to the above textbook material, read and make notes on the following material. We will discuss them in the tutorial.

- *I, Pencil*, by Leonard Read.
- *The Company of Strangers*, by Paul Seabright. Please only read “Part I: Tunnel Vision, Chapter 1, Who’s In Charge?” pp. 9-19.
- *They Clapped: Can Price-Gouging Laws Prohibit Scarcity?*, Prof. Michael Munger.

Short questions (to be handed in)

1. For the following terms, please prepare: (i) a non-technical explanation of its role in theoretical and applied economics, (ii) simple examples of how it might be used, and (iii) an outline of any conceptual or practical difficulties with the concept:
 - Optimising behaviour;
 - Equilibrium;
 - Heterogeneity.
 - Factors of production
 - Technology
2. Explain the nature of the opportunity costs of the following activities:
 - Attending a lecture;
 - Spending time on a train;
 - Extracting oil from underground.

Maths problems (to be handed in)

1. (From Perloff)

Green, Howitt, and Russo (2005) estimate the supply and demand curves for California processing tomatoes. The supply function is:

$$\ln Q = 0.2 + 0.55 \ln p \quad (1)$$

Where Q is the quantity of processing tomatoes in millions of tons per year and p is the price in dollars per ton. The demand function is:

$$\ln Q = 2.6 - 0.2 \ln p + 0.15 \ln p_t \quad (2)$$

Where p_t is the price of tomato paste (which is what the processing tomatoes are used to produce) in dollars per ton. In 2002, $p_t = 110$. What is the demand function for processing tomatoes, where the quantity is solely a function of the price of processing tomatoes? Solve for the equilibrium price and the quantity of processing tomatoes. Draw the supply and demand curves (note that they are not straight lines), and label the equilibrium and axes properly.

2. Maths workbook Ch1 (Review of Algebra) Sections 1, 3.1-3.4, 4.

Questions from Worksheet 1: 1, 2, 3, 4, 5, 6, 9(a) (b), 10(a) (b), 12(a)

Ch2 (Lines and Graphs) Sections 1, 2, 3 and 6

Worksheet 2: 1, 3, 4

Week 2: Supply and Demand

Maths problems

Tutorial: Monday, 20 October

Maths problems due Saturday, 18 October, 7pm at Keble Lodge.

1. (Katz and Rosen) An article about the market for marijuana made the following three observations:
 - a) in 1991, the price was \$ 80 per ounce, several years earlier the price was \$ 30 per ounce.
 - b) By 1991, marijuana smoking was no longer in vogue: “health concerns ...have risen above the desire to get giddy”
 - c) “Relentless police pressure had turned marijuana into a scarce commodity”.

Draw a set of supply and demand curves that are capable of illustrating these observations.

2. (From Krugman, Wells and Graddy, Economics) Show in a graph the effect on the demand curve, the supply curve, the equilibrium price, and the equilibrium quantity for each of the following events.
 - a) The market for the local newspaper. Event 1: the salaries of journalists go up. Event 2: there is a big news event in your city which is reported in the newspapers.
 - b) The market for cotton shirts. Event 1: the summer is unusually hot. Event 2: the price of cotton increases.
 - c) The market for crisps. Event 1: people realize how fattening they are. Event 2: people have less time to make themselves a cooked meal.
 - d) The market for your favourite economics textbook. Event 1: your university makes the textbook required reading. Event 2: printing costs for textbooks decrease because paper becomes cheaper.
3. The UK Government has a policy called “Help to Buy”, which effectively gives subsidies to buyers of houses (in England). See <http://www.helptobuy.org.uk/> for details of the various versions of the scheme. What will be the effect, in general, of such subsidies on house prices?
4. Maths workbook: Ch3 (Sequences), Quick Questions 5, 6; Longer Question 2.

Essay

Tutorial: Thursday, 23 October

Essay due Tuesday 21 October, 7pm by email to Ben.

Why might minimum wages have differential effects on different ethnic groups? How does this impact the validity of a welfare analysis performed by summing consumer and producer surplus changes? (1500 words max.)

Reading

Please read: [Chapter 15: Economic Efficiency](#) of David Friedman's *Price Theory: An Intermediate Text*. This reading might be quite difficult; you might need to reread it a few times.

The relevant textbook reading is: Begg, Vernasca, Fischer and Dornbusch 3,4 and/or Lipsey and Chrystal 3,4, Perloff 2 and/or Frank 2 and/or Varian 1 (9th and 8th eds.).

You might also want to have a look at:

[How the poor can afford to live in New York City](#), Megan McArdle for BloombergView.

Week 3: Supply and Demand

Please listen to these two episodes of NPR Planet Money:

- [The Raisin Outlaw Of Kerman, Calif.](#), ~5 min.
- [The Lollipop War](#), ~5 min.

Maths problems

Tutorial: Monday, 27 October.

Maths problems due Saturday 25 October, 7pm at Keble Lodge.

1. The demand curve for a good is given by:

$$Q_D = 20 - 2P \quad (3)$$

and the supply curve is:

$$Q_S = 0.5P \quad (4)$$

- a) Find the equilibrium price and quantity in this market.
 - b) What is the total consumers' surplus?
 - c) Suppose the government imposes a quantity tax on producers of 5 per unit. Find the equilibrium prices that producers receive and that consumers pay, and the changes in consumer and producer surplus. Who is affected more by the tax? Why?
 - d) Explain why the equilibrium with the tax is inefficient. Calculate the dead-weight loss.
 - e) Suppose the government imposes a price ceiling of 4. What will be the effect? How does this outcome differ from the equilibrium with the tax?
 - f) Suppose the government imposes an effective price floor. What will be the effect?
2. (From KR) According to Pommerehne and Kirchgasser (1987), the price elasticity of demand for theatre tickets in Germany is 1.73. Suppose that the price of theatre tickets falls by 10%. What happens to the quantity demanded? What happens to total expenditure on theatre tickets (or equivalently, theatre revenue)?
 3. In a Q&A on the [Freakonomics](#) blog, there was the following exchange between the bloggers and agricultural economist Daniel Sumner:

“Q: Are there any good arguments that support farm subsidies? ...

A: No. ”

Show, using supply and demand the effects of the following policies on the market for milk (please comment on the welfare of consumers, producers, and total welfare):

- a) An effective price floor
- b) An effective price ceiling
- c) A quota system (set below the market-clearing price and quantity)

If these types of market interventions have such bad consequences for consumers, why do these policies exist?

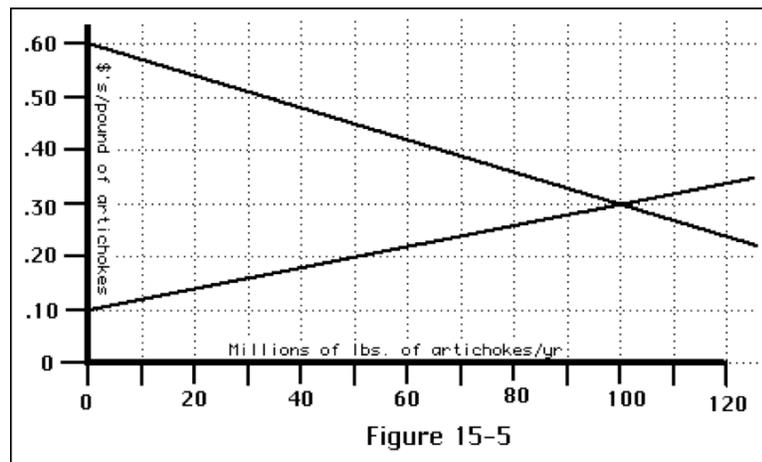
4. Maths workbook Ch4 (Functions): Quick Questions: 1, 4, 5. Longer Question 1.

Essays

Tutorial: Thursday, 30 October.

Essays due Tuesday 28 October, 7pm by email to Ben.

1. “EU Butter Mountain to return: The European Commission has announced plans to artificially boost prices by buying up 139,000 tonnes of dairy products at a cost to the public purse of £237 million. From March 1 until the end of August, the EU will become the owner of 30,000 tonnes of butter and 109,000 tonnes of skimmed powder milk, paid for at above market cost to support the dairy industry.” (Daily Telegraph, 2009). Analyse the effects of this policy on consumers and producers in the market for butter.
2. (From Friedman’s *Price Theory*) The government imposes a per pound tax on artichokes and the money is used to finance research on thermonuclear power. Each dollar spent on such research produces two dollars worth of benefits. How might we go about finding the optimal level of tax from society’s perspective? What should we try to maximise? What assumptions are we making when performing this sort of welfare analysis? [See figure 15.5 nearby]



Week 4: Production, costs, and factor demand

Reading

Production Functions and Short-Run Profit Maximisation: Varian Ch19 (9th ed.) (Technology), Ch20 (9th ed.) (Profit Maximisation - up to section 20.6) [8th edition: chapters 18 and 19]. Either Frank Ch9 (Production) or Katz and Rosen Ch8 (Technology and Production) or Perloff Ch6.

Cost Minimisation and Cost Functions: Varian Ch21 (Cost Minimisation; sections 21.1, 21.2, 21.4), Ch22 (Cost Curves) [8th edition chapters 20 and 21]. Either Frank Ch10 (Costs) or Katz and Rosen Ch 9 (Cost) and Ch 10 (The Price-Taking Firm; section 10.1) or Perloff Ch7.

If you need something ‘fun’ to listen to, consider this episode of EconTalk: [Munger on Milk](#), ~1 hour.

Maths problems

Tutorial: Monday, 3 November.

Maths problems due Saturday 1 November, 7pm at Keble Lodge.

1. Are the following statements true or false? (Give a brief explanation.)
 - a) Average total costs always exceed average variable costs.
 - b) When marginal cost is increasing average cost must be increasing.
 - c) A perfectly competitive firm will not operate where marginal cost is less than average cost.
 - d) A perfectly competitive firm operating at a point of decreasing returns to scale must be making a profit.
2.
 - a) How are total, average and marginal cost curves derived from the production function of the firm and the costs of factors?
 - b) What is the link between the average cost function and returns to scale?
 - c) What is the economic rationale for the conventional assumption that the average cost function is U-shaped?
 - d) Why are average costs higher in the short-run?
3. A firm has production function $Y = 6KL^{1/2}$ (where K and L are capital and labour).
 - a) Does it have decreasing, constant, or increasing returns to scale?
 - b) Draw the isoquants, with L on the vertical axis. What happens to the MRTS as K increases? Interpret this result.

- c) In the short run, capital is fixed at $K = 4$. Sketch the short-run production function, and find the marginal product of labour (MPL). Does the firm have constant, increasing or diminishing returns to labour?
- d) The market wage is w , and the market price of a unit of output is p . Explain why the firm will choose its labour input so that $p\text{MPL} = w$. If $p = 1$ and $w = 2$, how many workers will it employ?
4. A company producing bicycles has two plants, A and B. The numbers of bikes produced per month in the two plants are $Y_A = 40L_A^{1/2}$ and $Y_B = 210L_B^{1/3}$, where L_A and L_B are the numbers of workers employed. Suppose that 400 workers are currently employed in plant A, and 1000 in plant B. Find
- total output
 - output per worker
 - the marginal product of labour in each plant.
 - Should the company consider moving workers from one plant to another? Explain.
5. Suppose that cars are produced using workers and robots, according to a convex technology $Y = f(L, R)$. A firm wants to produce y_0 cars. Explain, using a diagram, how the firm should choose its inputs if the factor prices are w and r . What would happen if: (i) the wage increased? (ii) the design of robots improved?
6. Maths workbook: Ch5 (Differentiation) Worksheet 5: All the questions (except 4c)

Essay

Tutorial: Thursday, 6 November

Essays due Tuesday 4 November, 7pm by email to Ben.

- The law of diminishing marginal returns is necessary and sufficient for the supply curve in a competitive market to slope upwards. Nothing else affects the slope of the supply curve. Discuss. (~1000 words)
- What particular aspects of a perfectly competitive industry ensure that the condition “price=marginal cost” holds? Will the price of a product in a perfectly competitive industry be equal to:
 - The marginal cost of all firms in the industry;
 - The average cost of the marginal firm;
 - Both;
 - Neither?

Week 5: Competition and monopoly

Reading

Perfect Competition: Varian Ch23 (Firm Supply) Ch24 (Industry Supply) [8th edition chapters 22 and 23]. Either Frank Ch11 (Perfect Competition) or Katz and Rosen Ch11 (Equilibrium in Competitive Markets) or Perloff Ch8.

Elasticity, Monopoly: Varian Ch15.5-15.11 on Elasticity. Varian Ch25 (Monopoly) [8th edition Ch 24] Either Frank Ch12 (Monopoly) or Katz and Rosen Ch13 (Monopoly) or Perloff Ch11.

If you need something ‘fun’ to listen to, consider this episode of NPR Planet Money: [Mavericks, Monopolies And Beer](#), ~20 min.

Maths problems

Tutorial: Monday, 10 November

Maths problems due Saturday 8 November, 7pm at the Keble Lodge.

1. Draw a diagram to show how the monopoly price and quantity are determined.
 - a) Explain intuitively why the marginal revenue curve lies below the demand curve. Prove this algebraically.
 - b) What is the relationship between the monopoly price and the price elasticity of demand? Will production be at minimum average cost? Why or why not?
 - c) What is meant by the “deadweight loss of monopoly”?
 - d) If the demand curve is $q = 100 - 0.5p$ and the monopolist’s total cost function is $C(q) = q^2$, what output would a profit maximising monopolist choose? What is the price elasticity of demand at this output?
2. Consider a perfectly competitive industry with 24 producers, each with cost function: $C(q) = 16 + 4q^2$. Market demand is given by $Q = 150 - 2p$.
 - a) Calculate the supply function for each individual firm $q(p)$, aggregate supply Q^S and the equilibrium price p^* .
 - b) In the long run, more producers (with the same cost function) can enter the market. How many producers will be in the market in the long-run equilibrium and what is their equilibrium production?
3. Maths workbook Ch6 (More Differentiation) Quick Questions 7, 8, 9. Longer Question 2.

Essay

Tutorial: Thursday, 13 November

Essays due Tuesday 11 November, 7pm by email to Ben.

Consider a perfectly competitive industry. What are the short-run and long-run effects on price and industry supply of (i) a change in preferences which leads to an inward shift of the industry demand curve; (ii) technological progress which reduces each firm's marginal costs; and (iii) the introduction of a fixed annual charge which firms must pay in order to trade?

Finally, in less than 500 words each, address the following:

1. Since monopolies make super-normal profits, would it be a good idea to tax them?
2. (From KR) Airports limit the number of restaurants that can operate within their facilities. In some instances, all of the food concessions within an airport are granted to a single vendor, who pays rent to the airport. How much should a vendor be willing to pay to the airport to be the sole supplier? What would happen to the rent that the airport could charge if it decided to let a large number of suppliers set up restaurants on its premises?

Week 6: Imperfect competition

Reading

Katz and Rosen Ch14 (More on Price-Making Firms) , Ch15 (Oligopoly and Strategic Behaviour) Varian Ch 26 (Monopoly Behavior), Ch 28 (Oligopoly; skip the sections on Price Leadership) [8th edition Chapters 25 and 27]. Supplementary reading: Frank Ch13 (Imperfect Competition; skip the first section on the Theory of Games). Katz and Rosen Ch 14. Perloff , Ch12.1-4, Ch14.3, 14.4, 14.6, 14.7.

If you need something ‘fun’ to listen to, consider this episode of This American Life: [The Fix Is In](#), ~1 hour.

This is actually quite a remarkable story: it inspired the movie *The Informant*.

Maths problems

Tutorial: Monday, 17 November

Maths work due Saturday 15 November, 7pm at Keble Lodge.

1. There are two firms (A and B) in an industry. Firm A has costs $C = F + cq_A$ and firm B has cost $C = F + cq_B$, where q_A and q_B are the amounts produced by the respective firms. Market demand is $Q = a - P$, and total supply is $Q = q_A + q_B$.
 - a) Write down the profits for each firm, and hence find their reaction (or best?response) curves. What would firm A produce if firm B set $q_B = 0$?
 - b) Identify the Nash (Cournot) equilibria of this game.
 - c) What is the market price at equilibrium? What are profits?
 - d) Suppose both firms chose to produce $q_A = q_B = (a - c)/4$. How much profit would they make? Why is this not a Nash equilibrium?
 - e) Calculate the output that would be sold under perfectly competitive conditions in this market. What would a monopolist produce? How does Cournot competition compare with perfect competition and monopoly?
 - f) Illustrate your answer to (a) to (e) using a diagram.

2. This is a question that uses material from next week’s lectures: An individual consumes x_1 of good 1 and x_2 of good 2. Utility is given by $u(x_1, x_2) = x_1^{1/2} x_2^{1/2}$. The consumer has income of £40, the price of good 1 is 4 and the price of good 2 is 2.
 - a) Calculate the MRS for this utility function.
 - b) Draw a few of the indifference curves for this utility function.
 - c) What quantities maximize the consumer’s utility?
 - d) What is the marginal utility of income?

3. What does each of the following terms imply about the partial elasticities of the demand function $x_1(p_1, p_2, m)$? Normal good, inferior good, luxury, necessity, ordinary good, Giffen good, complements.
4. Maths workbook Worksheet 7, Quick Questions 1-6.

Essay

*Tutorial: Thursday, 20 November (NB - tutorial times are different this week!)
Essays due Tuesday 18 November, 7pm by email to Ben.*

Explain and compare what happens in a duopoly when firms compete simultaneously in prices and in quantities. In the latter case, what happens if they compete sequentially? Which model, price-setting or quantity-setting is better? When may it be reasonable to model firms as competing sequentially? (~1000 words)

Short answer questions:

1. A man with a hand grenade comes up to you in the street and says, "Give me one pound, or I will pull the pin." Assume that, if he pulls the pin, you both receive a large negative payoff. Draw a game tree to illustrate this situation. How might an economist solve this sort of game? What would you do? (~100 words)
2. If you have seen *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb* this question should be easy: What is a 'doomsday device'? How does this relate to a 'grim trigger' strategy or commitment? (~100 words)
3. Two firms with identical marginal costs and no fixed costs simultaneously choose prices. The firm with the lower price serves the entire market. If prices are equal, the firms share the market equally. What is the Nash (Bertrand) equilibrium? Draw best response functions for the two firms.

What happens if there is one price-setting firm in the market and a potential entrant can costlessly enter and compete on price? Briefly comment on whether or not the situation would differ materially if firms in the market set quantity? (800-1000 words)

Week 7: Preferences, constraints, and demand

NB - Only one tutorial per week from now on. All work due on Tuesdays and to be handed in at Keble lodge by 7pm; tutorials on Thursday.

Reading

Varian Ch 2, 3, 4, 5, 6

Either Frank Ch2, Ch3 (to p 89), Ch4 (to p100) or Katz and Rosen Ch1, Ch2.1-3.2 or Perloff Ch3, Ch4

Essay

Up to 1000 words plus diagrams:

Pensioners have well-behaved preferences and a fixed income to spend on food and winter fuel. In response to public concern about the implications for the elderly of high fuel prices, the government is considering two possible policies: (a) an increase in the old-age pension, or (b) a per-unit winter fuel subsidy for pensioners. Using indifference curve analysis, explain and compare the effects of these policies. Which is more effective?

Problem set

1. Draw indifference curves to illustrate each of the following statements, commenting on the nature of preferences and on the marginal rate of substitution in each case:
 - a) I like Coke and Pepsi, and I don't care which I drink - I can't tell them apart.
 - b) I love Coke but hate Pepsi.
 - c) I love Pepsi but have no feelings one way or the other about Coke.
 - d) I always have milk in my coffee, but I never drink milk alone.
 - e) I like tea and coffee, but too much of either stops me sleeping.
2. A household has a weekly disposable income of £100, and consumes only sausages and potatoes. Sausages cost £4 per kg, and potatoes cost £2 per kg. The government, which is concerned about the household's diet, provides a free weekly allocation of 5kg of potatoes, and taxes sausage consumption above 10kg per week at 50p per kg. Draw the household's budget set.
3. State and explain the axioms necessary to derive a consistent preference ordering. Is it reasonable to assume that all consumers do have preferences that conform to these axioms? What additional assumptions are required for well-behaved indifference curves? Are these assumptions reasonable? What assumptions are required to ensure that indifference curves do not cross?
4. A student has £2 to spend on beer and orange juice. Initially, orange juice costs £0.50 a pint and beer costs £1 a pint.

- a) Draw the student's budget line. Place orange juice on the horizontal (x) axis and beer on the vertical (y) axis.
 - b) Suppose that, following a College subsidy, orange juice costs £0.25 a pint for the first 10 pints, and £0.50 a pint thereafter. Draw the student's budget line in this case.
 - c) Repeat the exercise, but assume that the student has £4 to spend on drinks.
5. Sabine can't tell the difference between Columbian and Kenyan coffee – the two taste exactly the same to her.
- a) What is Sabine's marginal rate of substitution between Columbian and Kenyan coffee?
 - b) Draw a few of Sabine's indifference curves for Columbian and Kenyan coffee. Place Columbian coffee on the horizontal (x) axis and Kenyan coffee on the vertical (y) axis.
 - c) Sabine has £6 to spend on coffee this week. Kenyan coffee costs £1.50 per cup and Columbian coffee costs £1 per cup. Draw Sabine's budget line for Columbian and Kenyan coffee in the same diagram.
 - d) What is Sabine's optimal consumption bundle? Show this on your diagram.
 - e) If the price of Columbian and Kenyan coffee is the same, what combination of Columbian and Kenyan coffee will Sabine buy?
6. Max is a utility maximiser. His income is £100, which he can spend on canteen meals, and on notebooks. Each meal costs £5, and each notebook costs £2. At these prices, Max chooses to buy 16 canteen meals, and 10 notebooks. Now the price of notebooks falls to £1, while the price of canteen meals remains the same. At the same time, his income falls to £90. Do these two changes combined allow him to get onto a higher indifference curve, the same indifference curve as before, or a lower indifference curve?
7. Define the following terms, choosing a logical order and providing a framework to show the relationships and differences between them:
normal good, luxury, Giffen good, substitutes, inferior good, necessity, ordinary good, complements.
8. A student's utility is given by $u(i, s, l) = i^{2/3}l^{1/3}s^{1/2}$, where i , s , and l are the number of hours spent idling, lazing about, and sleeping respectively. A day contains 24 hours.
- a) In a given day, how should the student allocate their time to maximize utility?
 - b) Once a week the student is required to spend an hour at a tutorial (from which utility is zero). How much less time should be sleeping that day?

9. Suppose the price of a good increases and the government decides to compensate each consumer for the price increase by giving each individual a lump sum transfer equal to the increase multiplied by the original quantity purchased by that individual.
- a) When will this compensation strictly increase the welfare of the consumers?
 - b) When will the compensation keep the consumer's welfare at the original level?
10. A consumer has well-behaved preferences for current and future consumption, c_1 and c_2 . He has current income y_1 , and future income y_2 , and can borrow and save at the market interest rate. Write down his lifetime budget constraint. Suppose that at the initial interest rate he is a saver. Show that if the market interest rate rises he must be better off. Will his current consumption increase?

Maths problems

Ch 8 (Unconstrained Optimisation) sections 8.1, 8.2, 8.4

Worksheet 8, Questions 1, 2, 4.

Ch 9 (Constraints) Sub-Sections 1.1, 1.2

Worksheet 9, Quick Question 4.

Varian Ch 5 Appendix (omit the Lagrangian method)

Varian Ch 6 Appendix

Week 8: Income and substitution effects

NB - Only one tutorial per week from now on. All work due on Tuesdays and to be handed in at Keble lodge by 7pm; tutorials on Thursday.

Questions marked with a star (*) are optional.

Reading

Varian Chs 8-9

Katz and Rosen Ch4 (4.1 Income and Substitution Effects)

Frank Ch 4

Perloff Ch5

Short essay

In no more than 500 words (excluding diagrams) address the following: On the advice of an economic advisor, the Chancellor of the Exchequer decides to reduce the income tax bracket at which the 40% rate binds from £34,800 p.a. to £30,000 p.a. Analyse the likely effect of this policy on work incentives.

Discussion questions

Textbooks often refer to the “Polonius point” in reference to a model of inter-temporal consumption. What point are they referring to and why?

Why might increase access to credit in developing countries help reduce child labour?

Problem set

1. An individual has a fixed income and buys two goods, apples and bananas.
 - a) Explain the difference between a normal good and an inferior good.
 - b) Explain, using a diagram, how the effect of a rise in the price of apples can be decomposed into a substitution effect and an income effect.
 - c) Under what conditions would a rise in the price of apples lead to an increase in this individual’s demand for apples?

Suppose now that the individual has an endowment of 3 apples and 1 banana, and has no income other than that from selling her endowment. The price of bananas is always 1. Assume that she has well-behaved preferences. Initially the price of apples is 1 and she consumes 2 apples and 2 bananas.

- d) Would a rise in the price of apples to 2 make the individual better off or worse off?

- e) Would a fall in the price of apples to $1/2$ make her worse off (compared to the situation where the price of apples was 1)?

Write down and briefly explain the Slutsky equation capturing your answer to 1(b). Why is the substitution effect always opposite to the price movement?

2. Suppose that a consumer has a demand function for beer in the form $x_1 = 5 + \frac{m}{5p_1}$. Her income is £40 per week and the price of beer is £2 per pint. What is her demand for beer? Now suppose the price of beer falls to £1. What is her total demand at the new price? What is the substitution effect? What is the income effect?
3. a) Explain how a worker will vary the number of hours he works in response to a rise in the wage rate, decomposing the change into income and substitution effects.
 b) Write down the Slutsky equation for this problem.
 c) If a rise in the wage leads to a fall in hours worked, what does that imply about the income and substitution effects?
4. Pensioners have a fixed income in the form of a pension from the government, and well-behaved preferences over food and fuel. Suppose that the prices of food and fuel have recently changed: the Laspeyres price index has risen by 20%. If the government now increases the pension by 20%, what will happen to the welfare of pensioners?
5. Draw a diagram to illustrate the following decisions by a consumer with a fixed income facing a choice of two goods, X and Y:

	Income	Price of X	Price of Y	Amount of X purchased
Situation 1	40	1	1	20
Situation 2	60	2	1	25

Is this optimising behaviour with well-behaved preferences?

6. John is a utility maximizer. His weekly income is M , which he spends on goods x_1 and x_2 , costing p_1 and p_2 respectively.
- a) Draw John's budget constraint and show that the slope of the line is the ratio of the prices.
- b) John has the following utility function $U(x_1, x_2) = x_1 + x_2$. Derive and sketch John's demand curves for goods 1 and 2.
- c) Assume now that John's utility function is $U(x_1, x_2) = \min(x_1, x_2)$. Draw a few of John's indifference curves. Compare and contrast to part b.

- d) Illustrate graphically how a demand function for (i) normal good x_1 (ii) inferior good x_1 can be derived as the set of optimal quantities of x_1 , by varying p_1 (holding M and p_2 constant) in the preference maximization (x_1, x_2) space.
7. Show that for a consumer with Cobb-Douglas utility $U = x_1^a x_2^{1-a}$, the demand functions are:

$$x_1 = \frac{am}{p_1}, \quad x_2 = \frac{(1-a)m}{p_2} \quad (5)$$

What special properties do these demand functions have? Draw a diagram to show the income and substitution effects of an increase in p_1 , illustrating the Cobb-Douglas properties.

8. A student receives a scholarship of £2000 per annum. £1000 of this is needed for essential expenditure. The rest can be spent on books, price £20 each (with no second-hand value) and luxuries, price £10 (which contribute only to current utility). The student's utility function is:

$$U(B, L) = B^2 L^3$$

- Find the marginal utilities of books and luxuries, and the MRS of luxuries for books, as a function of B and L . Is this a well-behaved utility function?
 - The student chooses his consumption of books and luxuries to maximise his utility. Will he spend all his income? Why?
 - Using the condition $MRS = -p_1/p_2$, find how many books and luxuries he will buy.
 - Now consider the more general problem when disposable income is I and the prices of books and luxuries are p_B and p_L . Repeat the analysis in (c) to find the demand function for books, as a function of prices and income. What special properties does this demand function have?
 - Are these "luxuries" in the economic sense?
 - How does the analysis change if books have a second-hand value of £5?
9. * Using the same method as above find the demand functions for books and luxuries when the utility function is:

$$U(B, L) = 2B^{1/2} + L$$

What special property arises here? Illustrate it using an indifference curve diagram. Are luxuries luxuries in this case?

10. * See Varian Ch 8A

- Write down and explain the Slutsky Equation in terms of partial derivatives.

b) The demand function corresponding to a Cobb-Douglas utility function is:

$$x_1(p_1, m) = \frac{am}{p_1}$$

where $0 < a < 1$ is a constant. Find the substitution and income effects of a price change, and show that both are negative in this case.

The following two tutorial worksheets are to be completed over the vacation.

Week HT0: Consumers: applications and welfare

Reading

Varian Ch 9.8, Ch10, Ch 14

Katz and Rosen Ch4; Ch5 (The Household as Supplier; 5.2-5.3)

Frank Ch 5

Problems

1. (i) Explain how a worker will vary the number of hours she works in response to a rise in the wage rate, decomposing the change into income and substitution effects.
(ii) Write down the Slutsky equation for this problem.
2. A consumer has well-behaved preferences for current and future consumption, c_1 and c_2 . He has current income y_1 , and future income y_2 , and can borrow or save at the market rate of interest, r . Write down his lifetime budget constraint. Suppose that at the initial interest rate he is a saver. Show that if the market interest rate rises he must be better off. Will his current consumption increase?
3. A consumer faces an increase in the price of a good that she buys. Discuss the different ways in which the effect on her welfare can be represented.
4. Maths Workbook. Ch9 Longer Questions 1, 3. Ch 10 Quick questions 2, 4. Longer question 4.

Week HT1: Market failure and welfare economics

Reading

Varian Chapters: Welfare , Externalities , (Monopoly and Monopoly Behavior if not already covered)

Morgan, Katz and Rosen Ch 18 (Externalities and public goods), (Ch 13, Monopoly , if not already covered)

Frank Ch 16 (Externalities, Property Rights, and the Coase Theorem), (Ch 17 Government), (Ch 12, Monopoly if not already covered).

If you need something ‘fun’ to listen to, consider this episode of EconTalk: [Robert Frank on Coase](#), ~1 hour.

Problems

1. a) Using a demand and supply diagram, explain what the Pareto efficient quantity is.

- b) Explain for each of the following markets whether the Pareto efficient quantity is likely to be achieved: (i) iPads; (ii) wheat; (iii) electricity derived from burning coal.
 - c) Suppose that the current quantity differs from the Pareto efficient one. (i) Explain the policies that could achieve the Pareto efficient quantity. (ii) Will a move from the current quantity to the Pareto efficient quantity imply that there is a Pareto improvement?
2. Firm S produces steel, s , and effluent, x , which pollutes a nearby river. Firm M is a farmer, who produces milk, m ; the farmer's costs of milk production increase with the amount of effluent in the river.
- a) Illustrate this situation using a diagram showing the marginal costs and benefits of effluent production. Explain why you would expect the outcome to be Pareto inefficient.
 - b) Show that a policy maker could achieve an efficient outcome using a Pigouvian tax. How big should the tax be? Would this lead to a Pareto improvement?
 - c) Explain how the firms could achieve an efficient outcome without intervention by the policy maker. Would this lead to a Pareto improvement?

Essays

The answers should be of the length you could write in an exam in 45 minutes.

Essay 1: "Since perfect competition leads to an optimal allocation of resources there is no need for a government to intervene in economic matters". Discuss.

Essay 2: Outline (i) how a system of tradeable permits, (ii) a Pigouvian tax, and (iii) allowing the affected parties to bargain (provided property rights are clearly defined) could provide efficient solutions to problems of environmental pollution.