

PRELIMS MICROECONOMICS 2016-17

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The aim of this course is to get you conversant in the language of microeconomics. When non-economists think about economics, they typically think of the study of unemployment, growth, and other factors relating to the macroeconomy at large. However, behind the scenes lies a vast array of choices and transactions carried out by individual agents; be that individuals' choices of whether to work, how much to save, what to buy, firms' choices about how much to produce, what prices to charge and whether to invest, and government's choices about what to tax, what to subsidise, and what goods and services to provide. These are the sorts of microeconomic issues that we will study this term.

While at times the subject matter might at times seem abstract and overly technical, remember that the skills you will learn over the term will be invaluable to you as an economist. This course will introduce you to a core set of techniques and methods, which you must master before you can head off and apply economic analysis to the various topics that you might be interested in, from development economics to family economics to monetary economics. To help you make connections between the material we will study, and the aspects of the "real world" that you are interested in, I am (in the process of!) collecting articles and podcasts for you to delve into to help bring the subject to life (see <https://abiadams.com/teaching/prelims-micro/>).

ARRANGEMENTS

The course will proceed through a mixture of tutorials, classes, and lectures. The tutorials and classes are designed to complement the lecture series given by Ian Crawford. If you want to stand a good chance of mastering the material, you must attend the lectures.

CLASS WORK: Work for the classes must be brought to the class but not handed in beforehand. I will randomly select two pieces of work to take in at each class to mark.

TUTORIAL WORK: Work for tutorials must be handed in by 5pm on the Monday morning before tutorials. Late work will not be accepted and you will not be able to attend tutorials if you do not hand in your problem set.

TABLE 1. Timetable

	Monday	Tuesday	Wednesday	Thursday	Friday
1st	11am: Lecture	11am: Lecture	11am: Lecture 4pm: Class		
2nd	11am: Lecture 5pm: Deadline	11am: Lecture	11am: Lecture	2pm: Group 1 3pm: Group 2 4pm: Group 3	9am: Group 4 11am: Group 5
3rd	11am: Lecture 5pm: Deadline	11am: Lecture	11am: Lecture	2pm: Group 1 3pm: Group 2 4pm: Group 3	9am: Group 4 11am: Group 5
4th	11am: Lecture 5pm: Class 5pm: Deadline	11am: Lecture		2pm: Group 1 3pm: Group 2 4pm: Group 3	9am: Group 4 11am: Group 5
5th	11am: Lecture 5pm: Deadline	11am: Lecture	11am: Lecture	2pm: Group 1 3pm: Group 2 4pm: Group 3	9am: Group 4 11am: Group 5
6th	11am: Lecture 5pm: Class 5pm: Deadline	11am: Lecture 1pm: Group 1 2pm: Group 2 3pm: Group 3	5pm: Group 4 6pm: Group 5		
7th	11am: Lecture 5pm: Deadline	11am: Lecture 1pm: Group 1 2pm: Group 2 3pm: Group 3	5pm: Group 4 6pm: Group 5		
8th	11am: Lecture 5pm: Class 5pm: Deadline	11am: Lecture 1pm: Group 1 2pm: Group 2 3pm: Group 3	5pm: Group 4 6pm: Group 5		

READINGS

The core textbook for the course is *Intermediate Microeconomics* by Hal Varian. The chapter numbers given below refer to those in the 9th edition. Check that they are consistent with the edition you are using! If Varian's style is not for you, try the additional textbooks listed on the department website here. I've also added a few references to the 'CORE' curriculum textbook, which has a greater dose of current affairs and economic history than the course we teach in Oxford. You can find it here: <http://www.core-econ.org/>.

TOPIC 1 : EXCHANGE**THEMES :**

- What is Economics?
- Opportunity Cost
- Willingness to Pay & Demand
- Willingness to Accept & Supply
- Elasticity

READINGS :

- Varian, Chapter 1 & 15
- Maths Workbook, Chapters 1-2

Class : Introduction & Refresher (AA).

- (1) How important is the realism of economic assumptions?
- (2) Maths Workbook, Worksheet 1 : 8, 10, 11
- (3) Maths Workbook, Worksheet 2 : 4

Tutorial 1 (RM).

- (1) Explain the nature of the opportunity costs of the following activities:
 - (a) Spending time on a train.
 - (b) Extracting oil from underground.
 - (c) (Popularised by Robert Frank) You won a free ticket to see an Eric Clapton concert (which has no resale value). Bob Dylan is performing on the same night and is your next-best alternative activity. Tickets to see Dylan cost £40. On any given day, you would be willing to pay up to £50 to see Dylan. Assume there are no other costs of seeing either performer. What is the opportunity cost of seeing Eric Clapton? £0, £10, £40, or £50?

(2) Consider a linear demand curve

$$q_D = a - bp$$

Draw a diagram illustrating how the elasticity of demand varies along the demand curve (quantity on the horizontal axis, price on the positive part of the vertical axis, price elasticity on the negative part of the vertical axis). Indicate the point at which the elasticity is equal to minus one. Provide some economic intuition (a story) for why the elasticity might vary in this way with respect to price and quantity.

(3) Suppose that inverse supply is given by

$$p = -10 + \frac{1}{2}q_s$$

- (a) What could be the economic interpretation of the negative intercept?
- (b) Supposing that suppliers could costlessly dispose (a “free disposal” assumption) of unwanted units what would the supply curve look like?
- (c) If the price is 10, what is the producer surplus assuming free disposal?
- (d) What is the change in the producer surplus if the price increases to 11? Provide an economic intuition (a story) for this change.

Tutorial 2 (RM).

THEMES :

- Comparative Statics
- Pareto Efficiency
- Price Controls
- Taxation
- Production Possibility Frontier

READINGS :

- Varian, Chapter 16 & 19

- (1) According to HM Revenue and Customs, the significance of the borderline between cakes and biscuits is that a cake is zero-rated for VAT even if it is covered in chocolate, whereas a biscuit attracts standard-rate VAT if “wholly or partly covered in chocolate or some product similar in taste and appearance”. The leading case on the borderline is that concerning Jaffa cakes which are made by United Biscuits. They are currently zero-rated as cakes. HMRC is considering whether to re-designate them as biscuits, in which case they would be subject to standard rate VAT. You have been given the following information concerning UK sales of Jaffa cakes.
- Annual UK sales (in millions) are £2
 - Price per Jaffa Cake is £0.10
 - Price elasticity estimate = -0.5% ¹
- (a) Assuming that the demand curve is linear, derive the inverse demand curve for Jaffa cakes.
- (b) Assuming that the price in the table represents an equilibrium price, that the supply curve for Jaffa cakes is linear and that if the price were zero United Biscuits would not make any, derive an expression for the inverse supply curve.
- (c) At the equilibrium price, calculate (i) the consumer surplus and explain carefully what it measures, (ii) the producer surplus and explain what it measures. (iii) Draw and fully label a diagram to illustrate your calculations.
- (d) Suppose that HMRC re-designates Jaffa Cakes as biscuits and applies standard rate VAT. Calculate (i) the deadweight loss of the tax and explain what it measures; (ii) the amount of Government revenue the tax would raise. (iii) Draw a diagram to illustrate your calculations.
- (e) Explain what your results indicate about the effective incidence of the VAT.
- (f) You are concerned that the estimate of the price elasticity you have used is too low (i.e. it should be more negative). Without doing any further calculations outline how you would expect your results and conclusions to change if this were the case.

¹www.mysupermarket.com, United Biscuits.

- (2) The table below shows the unit labour requirements for four goods in two countries A and B. For our purposes we might wish to think of A as “the rest of the World” and B as some country of interest.

	Country A	Country B
Rubber chickens (hr/chicken)	2	4
Trousers (hr/pair)	2	2
Poison gas (hr/kg)	4	3
Beauty products (hr/millihelen)	3	2

In the absence of trade, wages in A are £4/hr and in B are much higher: £8/hr.

- For each good, calculate the ratio of the unit labour requirement in each country.
- What are the autarky prices of each good in each country.
- If the wage in A (“the rest of the World”) is fixed, in what direction must the wage in B change if the two countries open to free trade, in order for both countries to have something that they can export to the other?
- What are the highest and the lowest wages that can prevail in B with free trade, given the £4/hr wage in A?
- For which of the goods can you predict with certainty (given our assumptions) the pattern of trade, and what is it?
- Suppose that a free trade equilibrium is achieved with a £4/hr wage in A and a wage in B which is exactly at the mid-point of the range that you found on part (d). What will be the world prices of each good, and which country will export it?
- Suppose that workers in both countries work 40 hours per week, 50 weeks per year. Calculate their annual incomes in units of each good, both in autarky and free trade. In what sense, if any, have these workers gained from trade? Why (briefly) do workers in B appear to have gained, even though their wages are lower due to the effects of trade?

TOPIC TWO : FIRMS**Class : Introduction to Firms (AA).**

READINGS :

- CORE, Unit 7
- Maths Workbook, Chapters 3 - 5

- (1) Maths Workbook, Worksheet 3 : 5, 7
- (2) Maths Workbook, Worksheet 4 : 2
- (3) Maths Workbook, Worksheet 5 : 2

Tutorial 3 : Production (RM).

THEMES :

- Production Functions
- Isoquant & Isocost Curves
- Short & Long Run Costs
- Competitive Supply

READINGS :

- Varian, Chapters 20 - 23

- (1) The UK is described as having a “productivity gap” compared with other similar countries. This is usually based upon measures of output per unit of labour employed (hours worked).
 - (a) What is “productivity”?
 - (b) Under what circumstances is output per unit of labour a valid measure of productivity?
 - (c) How might cross-country differences in the size distribution of firms affect measurements of aggregate productivity?

(2) Suppose that a firm's production function is estimated to be

$$y = \frac{1}{2}L^{\frac{1}{4}}K^{\frac{3}{4}}$$

where y, L, K denote output, labour and capital respectively, and that the rental rate per unit of capital is £5 and wages are £10 per unit of labour. Suppose that the firm's capital stock is fixed in the short term at $\bar{K} = 2$.

- (a) Find labour demand as a function solely of output.
- (b) Find the firm's variable and average variable cost functions.
- (c) Find the firm's fixed and average fixed cost functions.
- (d) Find the firm's average cost function.
- (e) Find the firm's marginal cost function.
- (f) Draw the cost curves you have derived on a single diagram.
- (g) Derive the firm's short run supply curve.

(3) Consider a firm producing a good using two inputs: capital, K , and labour L . Its production function is denoted $F(K, L)$. Capital costs are denoted r and labour costs by w per unit.

- (a) How is the shape of the average cost curve for the firm affected by the presence returns to scale of various kinds?
- (b) Explain what is meant by the marginal rate of technical substitution between capital and labour.
- (c) Explain carefully, using diagrams, how the firm will choose K and L to minimise its long-run cost of producing a given level of output.
- (d) Suppose $F(K, L) = \sqrt{K} + \sqrt{L}$. (i) Show that F has decreasing returns to scale. (ii) Find the marginal rate of technical substitution between capital and labour.
- (e) Hence, or otherwise, find the cost-minimising long-run choice of K and L to produce a given level of output, y .
- (f) Find the minimum cost of producing the good as a function of y and w and r . Discuss briefly how it depends on y .

Tutorial 4 : Competition (RM).

THEMES :

- Investment
- Prisoners' Dilemma
- Cournot Competition
- Bertrand Competition

READINGS :

- Varian, Chapters 28 - 30

- (1) Suppose there are two firms, firm 1 and firm 2. Their products compete, and their inverse demand curves are (in an obvious notation)

$$p_1 = 10 - 3y_1 - y_2$$

and

$$p_2 = 30 - y_1 - 3y_2$$

respectively. Firm 1 has the cost function

$$c_1 = 3y_1$$

and firm 2 has the cost function

$$c_2 = 2y_2$$

- Are these products substitutes or complements?
- If the two firms are in Cournot competition how much should each produce?
- If they colluded how much should they jointly produce?

- (2) Consider a market with two symmetric firms (1 and 2). The inverse demand functions for the firms' goods are

$$p_1 = 4 - y_1 - \frac{1}{2}y_2$$
$$p_2 = 4 - y_2 - \frac{1}{2}y_1$$

The firms have the identical cost functions, given by

$$c(y_i) = 3y_i$$

for $i = 1, 2$.

- (a) Calculate the Bertrand-Nash equilibrium. What is the market price for each good in this equilibrium?
- (b) Are the prices of these goods strategic substitutes or strategic complements? Explain.
- (3) Explain why it may be difficult for two firms playing the Cournot game to collude.

TOPIC THREE : CONSUMERS**Class : Utility Maximisation (AA).**

READINGS :

- CORE, Unit 3
 - Varian, Chapters 2 & 3
 - Maths Workbook, Chapters 6 & 7
- (1) Maths Workbook, Worksheet 7 : 1, 4

Tutorial 5 : Consumer Choice (AA).

THEMES :

- Budget Constraint
- Utility Function
- Income & Substitution Effects

READINGS :

- Varian, Chapters 4 - 6
- (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 student receives a scholarship of £2000 per annum. £1000 of this is needed for essential expenditure. The rest can be spent on books, priced at £20 each (with no second-hand value) and luxuries, priced at £10 (which contribute only to current utility). The student's utility function is: $U(B, L) = B^2L^3$
- 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 her consumption of books and luxuries to maximize her utility. Will she spend all her income? Why?
 - Using the condition $MRS = -p_1/p_2$, and the budget constraint, find how many books and luxuries she will buy.
 - Now consider the more general problem when disposable income is m 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?
 - 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?

- (3) Using the framework provided by the Slutsky equation 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. Critically evaluate your answer.

Tutorial 6 : Welfare Economics (AA).

THEMES :

- Interpersonal Utility Comparisons
- Equivalent & Compensating Variation

READINGS :

- Varian, Chapter 14

- (1) Consider two perfectly divisible goods, x_1 and x_2 , which the consumer can purchase in any amounts she wishes. Suppose that the consumer's preferences are described by the utility function

$$u = \log x_1 + 2 \log x_2.$$

- (a) Show that the consumer's Marshallian/compensated demands for the two goods are

$$x_1 = \frac{1}{3} \frac{m}{p_1}$$

$$x_2 = \frac{2}{3} \frac{m}{p_2}$$

where p_1 and p_2 denote the prices of the two products and m is the consumer's available budget.

- (b) Suppose that the prices of both products are £1 and that the consumer has £2 to spend. What will be their demand for each product?
- (c) Draw a diagram showing the budget constraint, their chosen bundle and the rationalising indifference curve (place good 1 on the vertical axis).
- (d) Now suppose that these products are only available in discrete, indivisible, integer amounts (0, 1, 2, ...). Suppose that both prices remain at £1 and the consumer's budget remains at £2. What will be the consumer's demands? Explain your answer.
- (e) Show using a diagram (good 1 on the vertical axis) that the consumer will be worse off as a result of this indivisibility.
- (f) Using the prices $p_1 = \text{£}1$ and $p_2 = \text{£}1$ calculate a money-metric measure of the welfare cost of the indivisibility. Draw a diagram illustrating your calculation.

- (2) The government decides to help (hard-working) people on low incomes by introducing a tax credit which effectively raises earnings from work by 25% up to a threshold of pre-credit earnings of £20,000, after which the credit is withdrawn by one pound for every pound earned over £20,000. Consider three individuals at the time before the program was introduced:
- (a) someone who is not working;
 - (b) someone who was earning £20,000;
 - (c) someone who was earning over £20,000.

In each case what would happen to their hours of work and income after introduction of the program? Use a graph or graphs to illustrate your answer.

TOPIC FOUR : MARKET FAILURE

Class : Externalities & Public Goods (AA).

READINGS :

- Varian, Chapters 35 & 37
- Maths Workbook, Chapters 8 & 9

- (1) Consider the Dictator Game. Player 1 has a stake of size 1 which she can divide between herself and Player 2. Player 2 is passive recipient. Let x_1 denote Player 1's retained portion and let x_2 (which equals $1 - x_1$) denote their offer to Player 2. Suppose that Player 1 has a utility function given by

$$u_1 = x_1 - \frac{\alpha}{2} \left[\sum_{j=1}^2 (x_j - \bar{x})^2 \right]$$

where $\alpha \geq 0$

- (a) What general properties does this utility function have? How is inequality-aversion displayed? What restrictions on this model would give you the *homo economicus*, egoistic, special case?
- (b) Show that this utility function can be written as

$$u_1 = x_1 - \frac{\alpha}{4}(x_1 - x_2)^2$$

[hint: you can think geometrically rather than algebraically, if you wish, and use the fact that in this case $\bar{x} = \frac{1}{2}$ and x_1 and x_2 must be located symmetrically around it.]

- (c) Derive the offer (x_2) as a function of their inequality aversion parameter α .
- (d) Show that the offer to Player 2 is increasing in α .
- (e) Show that this utility function can rationalise any offer less than or equal to $\frac{1}{2}$, but could not explain why anyone would wish to give away more than half the stake.
- (f) Suppose that you observe
- (i) someone offering $\frac{1}{4}$. What is their α ?
 - (ii) someone offering nothing. What is their α ?

Tutorial 7 : Market Power (AA).

THEMES :

- Monopoly
- Monopsony

READINGS :

- Varian, Chapters 25 - 27
- CEP Policy Analysis, *The National minimum Wage: The Evidence of its Impact on jobs and Inequality*

- (1) Draw a diagram to show how the monopoly price and quantity are determined.
 - (a) Explain why the marginal revenue curve lies below the demand curve.
 - (b) What is the relationship between the monopoly price and the price elasticity of demand?
 - (c) Will production be at minimum average cost? Why, or why not?
 - (d) What, precisely, is meant by the “deadweight loss of monopoly”?

- (2) You are interested in analysing the behaviour of a monopolist. You assume that the firm has a linear demand curve $Y = \alpha + \beta P$ and have the following information:

Variable	Value
Output	2
Price	4
Elasticity	-2
Total Costs	4

- (a) Use the information in the table to show that the demand curve is $Y = 6 - P$ and find the inverse demand curve and the marginal revenue curve. Hence estimate the firm’s current marginal cost, explaining your reasoning.
- (b) By calculating consumer surplus and profits, and comparing with the competitive outcome, assess the welfare implications of monopoly in this industry. Use a diagram to illustrate your analysis.

(c) Without doing any further calculations, describe how you think your findings about the firm would have been altered if your estimate for the elasticity of demand had been higher.

(3) “Minimum wages result in higher unemployment”. Discuss

Tutorial 8 : Imperfect Information (AA).

THEMES :

- Adverse Selection
- Moral Hazard

READINGS :

- Varian, Chapter 38
- G. Akerlof (1970), *The Market for “Lemons”: Quality Uncertainty and the Market Mechanism*

- (1) 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.
- (2) “The introduction of a free market in Higher Education with no controls over tuition fees is a Lemons Problem waiting to happen”. Discuss