WHAT IS ECONOMICS?

- 17 th century France : Land as the foundation of value
- 18th. century England : explanation of growing trade, industrial revolution, starting with Adam Smith's 'Wealth of Nations'
  - specialisation leads to productivity gains at all scales from a pin factory to international trade
  - 'invisible hand' – the equilibrium arising from self-interested striving of many individuals

Theory of value includes capital and labour too

- The 'marginalist revolution' in the 1870s (Jevons, Menger, etc) made all this rigorous. marginal utility explains supply and demand. Why are essential goods like water cheap, while frivolous ones like diamonds are expensive?
- Late 19 th century : Marx provides theories of poverty + oppression, and suggests remedies

WHAT IS ECONOMICS (2)?

- End 19th century: monopoly as the serious flaw in the 'classical system'. Antitrust laws, especially in USA
- 1930s – explanations sought for the persistent unemployment of the Great Depression (Keynes, Hicks, ...)
- WW2 – production planning, econometrics, national accounts
- 1970s – how to explain and cope with persistent inflation (Friedman, ...)
- 1970s–80s – asymmetric information as an explanation for market imperfections
- 1990s – explanations for the behaviour of IT goods and services markets
- Also – now there's a huge diversity of subjects (healthcare, insurance, security, environment...)
- Large subject, growing constantly in response to new problems, but with a core of common tools

OVERVIEW

- Economics is traditionally made up of macroeconomics, microeconomics and specialised topics
- Macro is about the performance & structure of the global economy or a national / regional economy. It's about models of unemployment, inflation, growth, investment, savings, exchange rates, GDP, ...
- Micro is about how individuals and firms react to incentives, how market mechanisms establish prices, and the circumstances under which they fail. It deals with topics such as asymmetric information and externalities.
- Special topics of interest to computer scientists & engineers include the economics of information and the economics of dependability. We're also interested in security, risk and behavioral economics (the border between ecm + psychology)
- Almost all of our concerns are 'micro' rather than 'macro'; the tools range from mathematical models to empirical social science

Role of Theory

- Economic theorists usually build models that explain how incentives work, or fail to
- Example: George Akerlof, 'The Market for Lemons'
  - 100 used cars on the market in a town: 50 'plums' worth $2000 and 50 'lemons' worth $1000
  - The sellers know which is which; the buyers don't
  - What is the equilibrium price?
  - Many wider implications: why old people can't get affordable insurance, why bad security products drive out good ones, why Cambridge degrees are valuable...

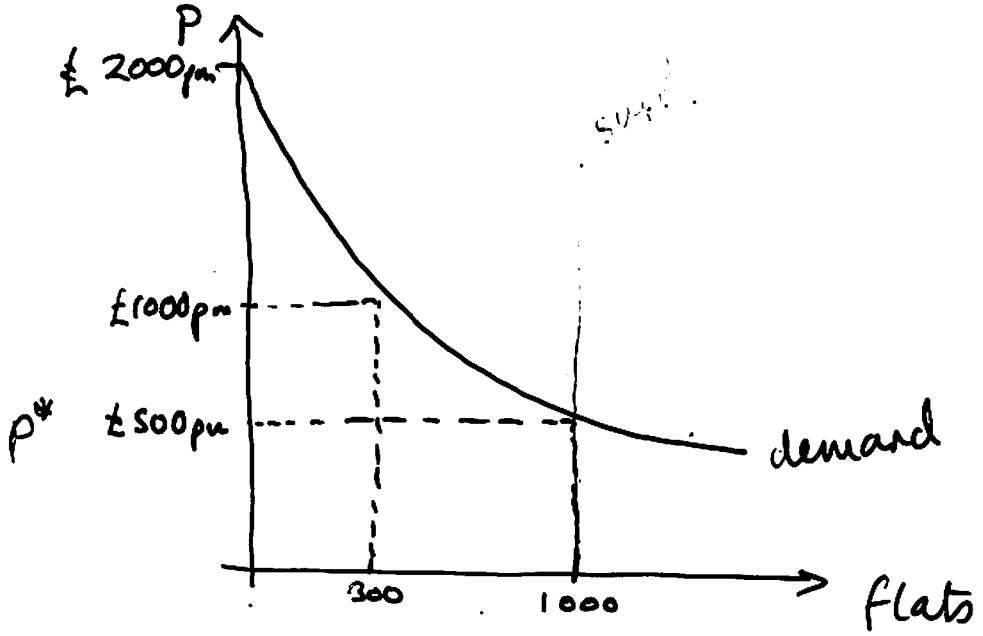
Role of Statistics

- Many economics papers are fairly straightforward statistical analyses
- Example: Todd Kendall "Pornography, Rape and the Internet", Economics of Software Industries 2007 (Toulouse)
  - Internet uptake went at different speeds in different US states
  - What crimes were correlated?
  - Rape and prostitution went down, while 'runaways' went up
  - The first two had significance concentrated among 15-24 y.o. males
- Economic methodology applies to a broader range of social questions than you might initially think!

More - see Levitt, "Freakonomics"

Example - Market for Accommodation

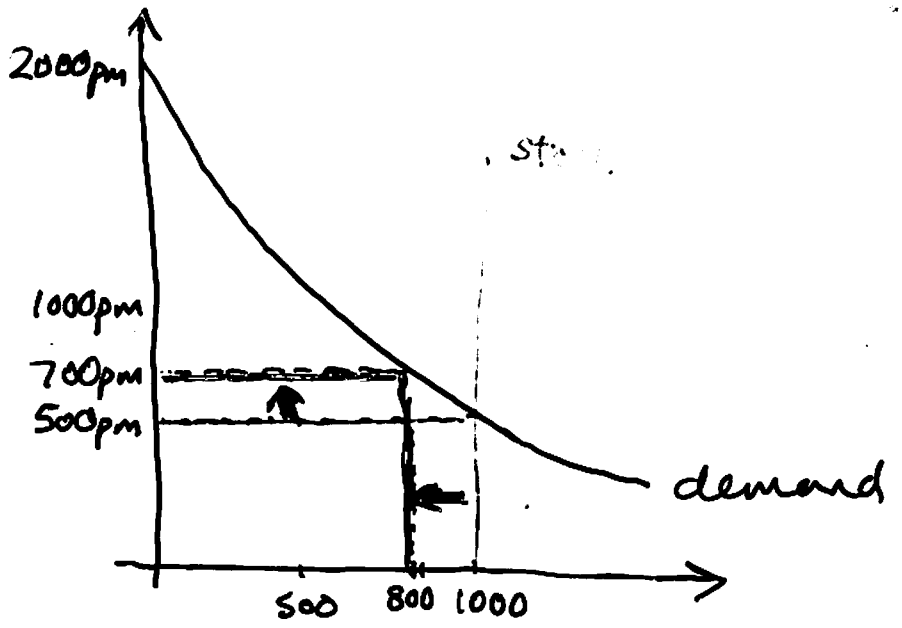
- Consider the market for rooms in Cambridge. Suppose there are two types – one-bedroom flats in town, or house-shares in Chesterton. Those who can't/won't pay for one of the flats go there
- The number of flats let will be a function of the rent:



- Eg., there might be one person willing to pay £2000
  - - - - 300 people - - - - £1000
  - - - - - 1000 people - - - - £500
- So if there are 1000 flats to let, and there are many competing landlords, the market equilibrium price p^* is where the demand curve meets the supply curve, i.e. £500

MONOPOLY

- Suppose that the market for accomodation is rigged - e.g., accomodation syndicate, senior tutors' committee, landlords' cartel...
- The landlords can usually make more money by restricting supply



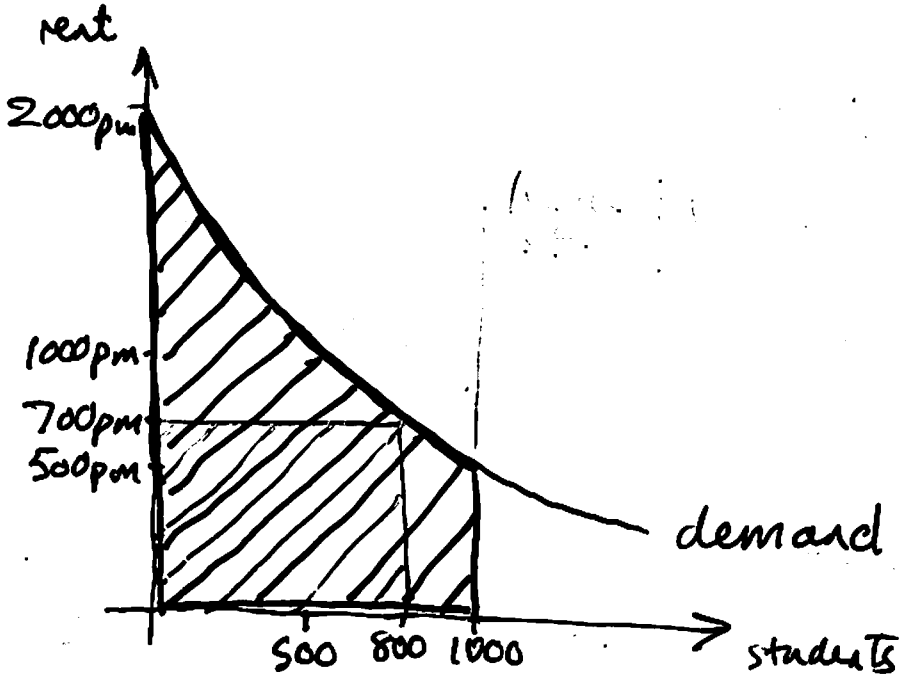
- E.g., 800 flats at £700pm = £560,000 pm > 1000 flats at £500pm (the size of the 'revenue box' in blue)
- Intuitively, this is inefficient - there are empty flats for which there are people prepared to pay a market rent.
- How do we formalise this?

EFFICIENCY

- The monopolist left some flats empty despite there being people who'd pay for them
- He could have made more money by letting one of them move in and giving her a secret 'cashback'
- Definition:
  - a Pareto improvement is a way to make some people better off without making anybody else worse off
  - a Pareto efficient allocation is such that no Pareto improvements are possible
- So how might the monopolist find a Pareto efficient allocation?

DISCRIMINATING MONOPOLIST

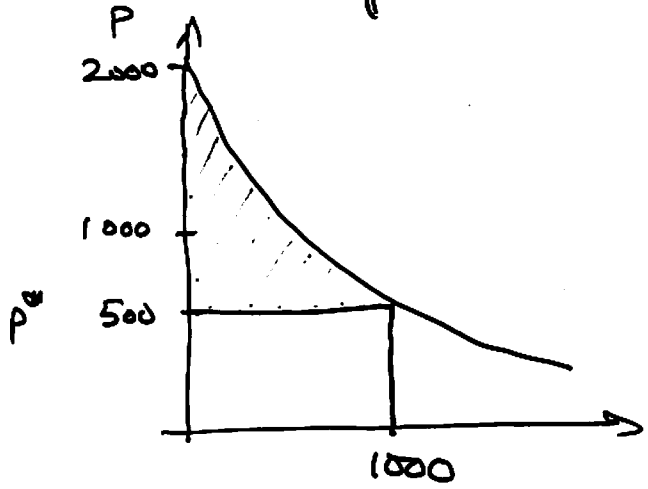
- The discriminating monopolist knows exactly how much each tenant is able to pay (the student from Brunei has a rent budget of £2000 pm, the five students from Qatar a budget of £1800pm, and so on)
- That's exactly what he charges them!



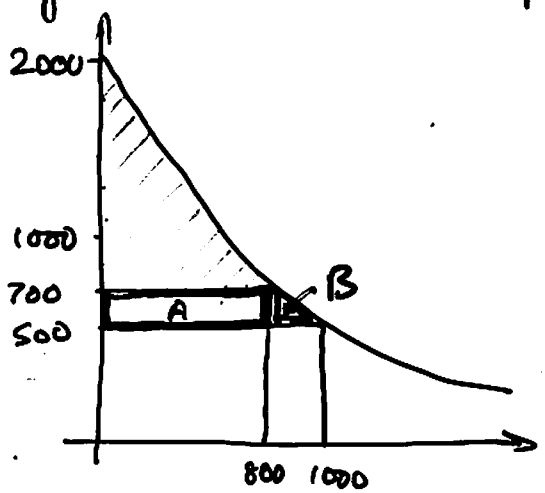
- He makes a lot more money — the red area rather than the blue area
- He captures all the surplus (the money the richer students would otherwise have saved out of their rent budget)
- This arrangement is efficient!

CONSUMER SURPLUS

- Consumer surplus is the total amount of money people saved on their reservation prices in a competitive market



- In the case of monopoly, this is reduced by the effect of the price increase (A) and the effect of the lost consumption (B)



- The usual test for monopoly is whether the consumer surplus is reduced

- Consumer surplus is a rough measure of the gains from trade. It's also what you'd have to pay people to give up consumption

MONOPOLY AND TECHNOLOGY

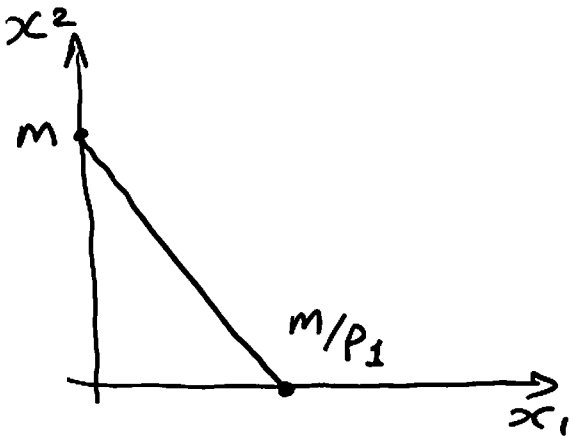
- Monopolies are common in the information goods and services industries; we will discuss the reasons in detail later
- Monopolists – and oligopolists – have a particularly strong incentive to charge customers different prices, & mop up all the available surplus
- Hence we find Microsoft selling many different versions of Vista, and also offering student discounts / bundles / deals...
- It's not just IT though. Think of airline tickets, cars and even food.
- So what factors determine the structure of markets?

BASIC CONSUMER THEORY

- Examines mechanisms of choice
- Consumers choose the 'best' bundle of goods they can afford
- For most analyses, it's enough to consider just two goods – e.g., books vs everything else
- Assuming a budget constraint m,

$$p_1 x_1 + p_2 x_2 \leq m$$

- Often, simplify further and set $p_2 = 1$; think of x_2 as the quantity of money left after buying x_1 books at price p_1
- Budget constraint gives a line on which choices must lie



PREFERENCES

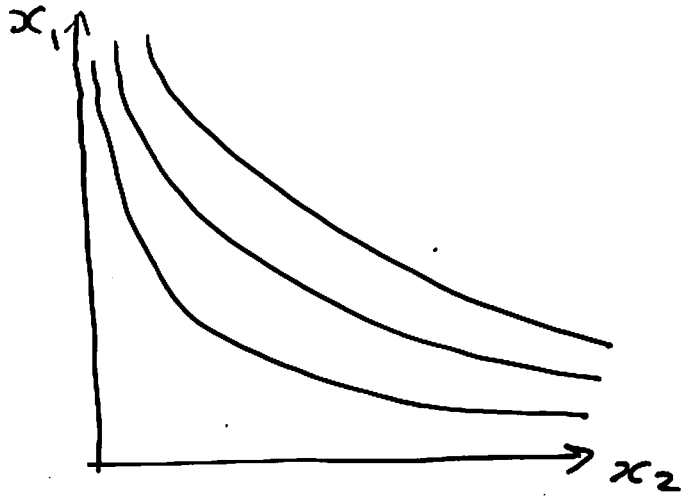
- If a consumer prefers bundle (x_1, x_2) to (y_1, y_2), we write

$$(x_1, x_2) \succ (y_1, y_2)$$

- If the consumer is indifferent, we write.

$$(x_1, x_2) \succsim (y_1, y_2)$$

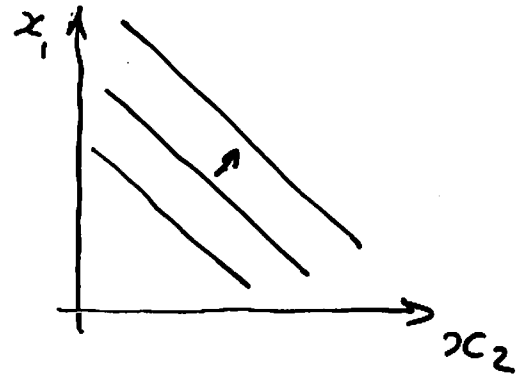
- We draw 'indifference curves' or 'isoquants'
- joining mutually indifferent points



- For the sake of argument, we'll assume they're well behaved (If (x_1, x_2) is preferred when (y_1, y_2) is affordable, then when (y_1, y_2) is preferred, (x_1, x_2) is not affordable — i.e., curves don't cross — 'weak axiom of revealed preference')

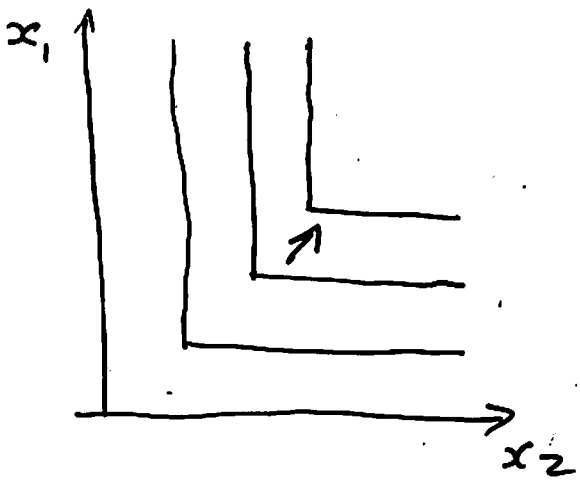
SUBSTITUTES AND COMPLEMENTS

- Sometimes I don't care at all whether I have good 1 or good 2 (Tesco's sugar or Sainsbury's sugar). Such goods are called <u>substitutes</u>



isoquants are straight lines
$x_1 + x_2 = k$

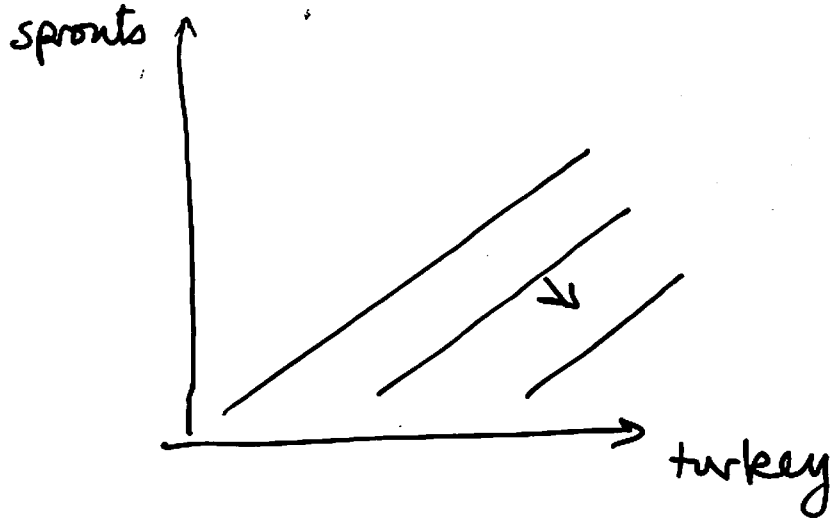
- Sometimes I want exactly the same number of good 1 and good 2 (left shoes and right shoes). Such goods are called <u>complements</u>



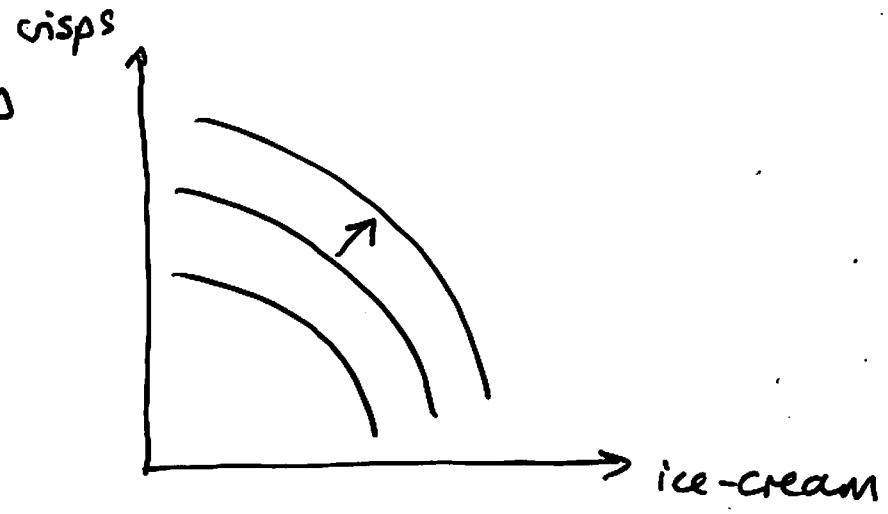
isoquants are right angles

OTHER INDIFFERENCE CURVES

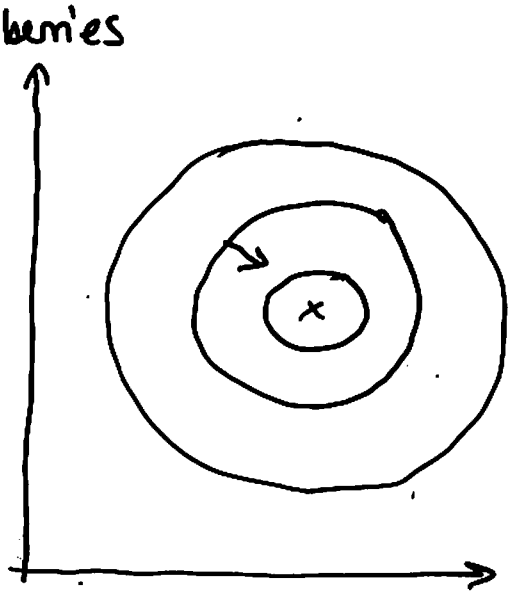
- Bads.



- Alternatives



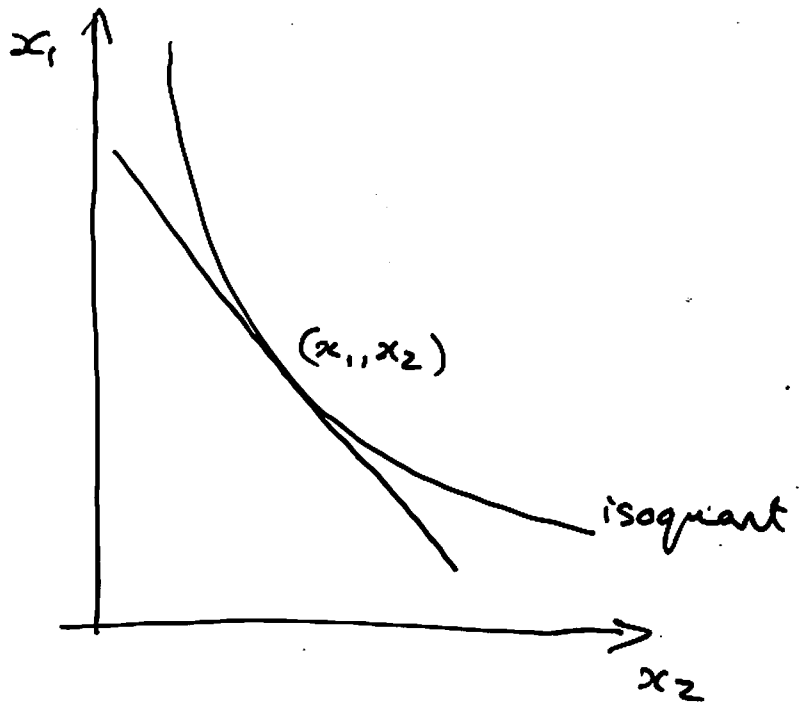
- Satiety



x : 'bliss point'

MARGINAL RATE OF SUBSTITUTION

- The tangent to an isoquant gives the marginal rate of substitution (MRS)



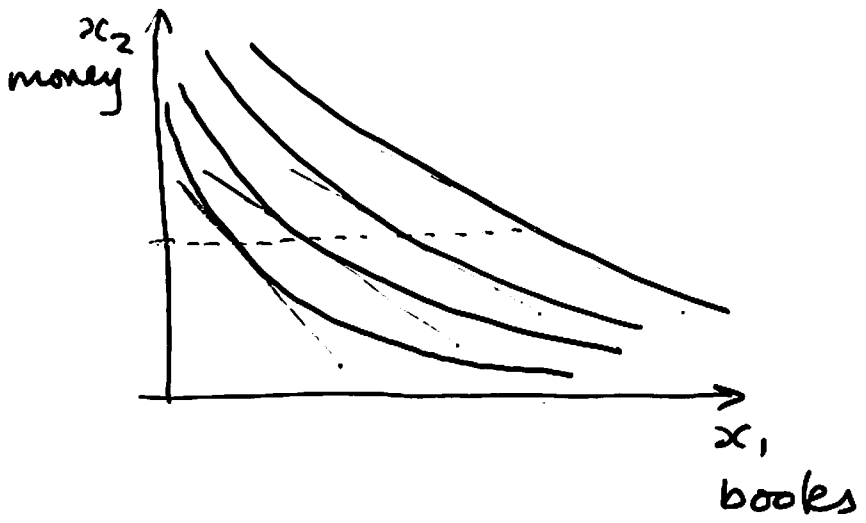
- This is the exchange rate at which that consumer, with that bundle of goods, will be prepared to trade the two

- $$MRS = \Delta x_1 / \Delta x_2$$

- Convex curves: more likely to trade the good if you have more of it, to get the good you have less of

DIMINISHING MRS

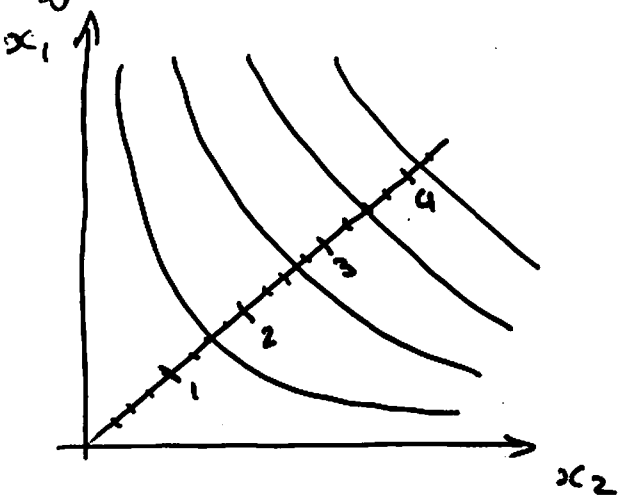
- The more you have of x_1 relative to x_2, the more likely you are to trade x_1 for x_2, in the strictly convex case



- i.e., you become less willing to pay for 'one more'

UTILITY

- Often, indifference curves can be parametrised



- Marginal utility

$$MU_1 = \frac{dU}{dx_1}$$

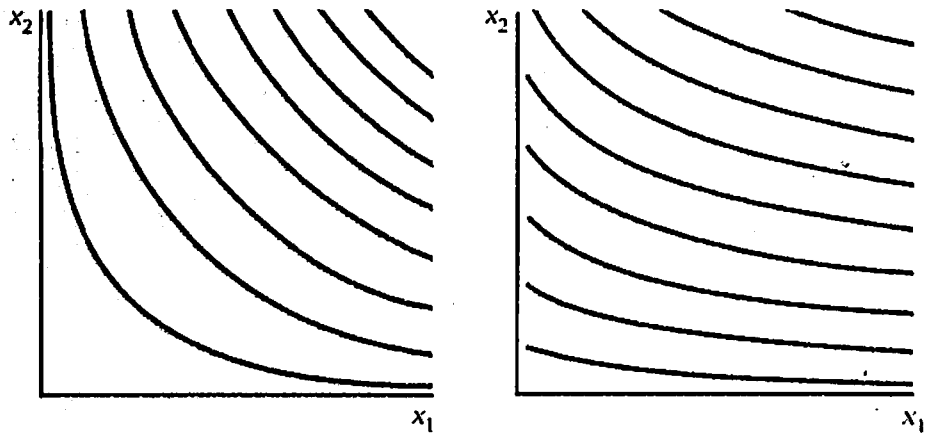
Then $$MRS = -MU_1/MU_2$$

- Utility functions are useful in describing consumer choices succinctly. They can often be estimated from empirical data about choices, and used to forecast answers to questions about how much people will pay for X to be better / faster / ...

Cobb-Douglas Utility

- Commonly used in econometrics:

$$U(x_1, x_2) = x_1^{\,c} x_2^{\,d}$$



A $c = 1/2$ $d = 1/2$ B $c = 1/5$ $d = 4/5$

Cobb-Douglas indifference curves. Panel A shows the case where $c = 1/2$, $d = 1/2$ and panel B shows the case where $c = 1/5$, $d = 4/5$.

- Reason: given a number of factors x, y, z and observed utility U believed to depend on x, y, z, take logarithms and see if there's a fit.