Game Theory

Strategy: algorithm whose input is game state and output is action: pure or mixed
Dominant strategy equilibrium if one action is better no matter other players action
Nash equilibrium if the optimal strategy depends on what the other player does
In fairmen, greedies, modest game, fairmen dominate if they are more than 1/3 of the initial population, but can be smaller if recognisable
Prisoners dilemma: fix with externalities (e.g. laws), or iterated dilemma (tit-for-tat)

Preferences

$(x_1, x_2) \succ (y_1, y_2)$: xs preferred
$(x_1, x_2) \cong (y_1, y_2)$: indifferent
Can draw isoquants (indifference curves) on consumption possib. frontier
Substitutes: straight isoquants
Complements: right angled isoquants (same # of both)
Bads: isoquants gradient +VE
Alternatives: convex isoquants
Satiety: circular isoquants around a central bliss point
Tangent to a isoquants is the marginal rate of substitution: rate at which trades occur
MRS diminishes with absolute quantity increases

Marginal Utility

Rate of change of utility wrt. to parameter, so MRS is the division of two MU: $\frac{-MU_1}{MU_2}$
Cobb-Douglas: $U(x_1, x_2) = x_1^c x_2^d$
Explains why frivolous goods e.g. fashion so expensive
Marx: capitalist gets surplus value of workers labour free

Markets

Supply, demand curves
Production, consumption possibility frontiers
Market for lemons: bad products drive out good ones
Pareto improvement: make some people better off without making others worse off
Monopolists can make more money by restricting supply
Perfect price discrimination to capture consumer surplus is Pareto efficient
Rent seeking: efforts directed at keeping claims to factors of production in fixed supplies
Elasticity: $\frac{\% \Delta Q}{\% \Delta P}$, price increase increases revenue when < 1
Short term cost strongly hyperbolic, long term shows [dis]economies of scale
AFC falls with output, AVC rises eventually (e.g. overtime)
In competitive market (firms price takers) profit maximised when marginal cost = price
Ricardo: comparative advantage due to opportunity cost of domestic production
Under perfect competition, free trade results in optimal production levels etc
Market equilibrium is Pareto optimal, any such optimal allocation can be achieved by market forces providing that preferences are convex

Macro-economics

Keynes: saving during recession crushes demand, low interest rates not enough, spend to get out of recession
Smith: growth due to capital accumulation over time
Marx: progress causes unemployment then revolution
Pigou: diminishing MU of money justifies progression

Social Utility (Welfare)

Arrows Impossibility Theorem: no way to aggregate individual preferences in a way that is consistent with democracy
Utilitarianism: sum of individual utility functions
Rawlsian: minimum of individual utilities
Conflict theory: poor fight harder for welfare than the rich fight to deny it (featuritis)
Tragedy of the commons

Externialit.

Not sold in markets, side effects: competitive outcomes not likely to be Pareto efficient
Theoretically fixable by using

	property rights Public goods: non-excludable, causes free riding
Lock-In	Durable complementary assets Skills, services Net present value of your customer base is the total cost of their switching Asymmetric switching costs, e.g. mobile phone providers, but capital depreciates..
Network Externialit.	Metcalfes Law: network value proportional to the square of the number of users "Virtual networks" depend on complements: PCs + software Create positive feedback, first mover advantage Mitigations: industry reaction, antitrust, technology progress
Price Discriminat.	Personalised pricing (haggling, loyalty cards), versioning (first class), group pricing (student) Public reaction a problem, conceal by bundling
Asymmetric Information	Sellers can offer warranty as a signal for product quality Adverse selection (made before entering system), moral hazard (result of entering): leads to surveillance, rationing
Auctions	Ascending, descending bid First, second price sealed bid All-pay: price raised by increments, pay to stay in Strategic equivalence Always best to bid truthfully in an ascending price auction Revenue equivalence theorem: under ideal conditions (inc. risk neutral bidders) well behaved (inc. bidder with highest value gets the good, bidder with lowest gets zero surplus: reserve price) auctions yield same revenues
Auction Problems	Private value: exogenously determined value, everything you buy is a bargain Common value: person who wins is that who most overestimates the price
Combinat. Auctions	Bidding rings, predation, sniping, risk averse bidders (bid higher at first price auction), signalling, objects sold simultaneously, budget constraints, externalities Bid is a disjunction of prices for combinations of items Used for routing problems
Intellectual Property	Patents, copyright, trademarks, trade secrets Trade secret: leaks eventually, reverse engineering problem Patent: novel, useful, non-obvious, per country, right to sue infringers of monopoly Trademark: registered ® or not ™, can sue infringers if misrepresentation Copyright: protects expression, not the underlying ideas, not necessarily registered but asserting helps give legal basis, life plus 70, fair use (criticism, parody)
Patents In IT	Software patents allowed in US, not Europe Portfolios defensive, get access to other companies by cross-licensing, lock-in! DMCA: offence to circumvent copyright control mechanism TPC: lock-in due to app data lockdown, sovereignty issues, censorship, trusted viruses..
Contracts	Commercial, offer+acceptance Terms can be attached to an offer, with protection (e.g. cannot limit liability) Sale of good acts: basic default terms covering sales Can specify jurisdiction of a contract, but foreign judgements may not apply unless you have assets there: contesting a foreign case will make you liable at home! Contract can specify you accept the foreign jurisdiction
Tort	Defamation, libel, slander Copyright: without © infringers can claim ignorance

Regulation	Consumer protection: things like putting addr. on website Hiring, credit have much regulation: follow it or your own rights disregarded
Laws	Criminal Evidence: ensure computer records admissible Data Protection: fairly lawfully processed, limited purposes, adequate relevant and not excessive, accurate, not kept longer than necessary, processed wrt. subject rights, secure, not transferred to countries w/out protection Computer Misuse: unauthorised access to program or data, poss. with intent to commit another serious offence, unauthorised modification (viruses): must clearly indicate 'unauthorised' Electronic Communications: digital signatures admissible RIP: interception (except delivered, stored data, lawful business practice but must make effort to tell those effected), surveillance, encryption (fine, but can be required to decrypt), oversight by secretary of state Distance Selling: seller must identify themselves, contract details delivered, cancel right E-Commerce: online selling and advertising subject to UK law in the UK no matter who the buyer is Privacy & Electronic Communications: bans unsolicited email to natural persons, cookies must be transparent (at least a choice)