Econ 301
Fall, 2025
Li, Hao
UBC

Lecture 1. Supply and Demand

- Demand.
  - Demand function.
  - Demand curve.
  - Movements along demand curve vs shifts of demand curve.

- Supply.
  - Supply function.
  - Supply curve.
  - Movements along demand curve vs shifts of demand curve.

- Price elasticity of demand.
  - Quantifying effect of marginal price change on demand.
  - Price elasticity generally changes along demand curve.
  - Use price elasticity to measure effect of price change on total expenditure.

- Price elasticity of supply.
  - Quantifying effect of marginal price change on supply.
  - Price elasticity generally changes along supply curve.
  - Use price elasticity to measure effect of price change on revenue.

- Tax incidence.
  - Effect of marginal increase in sales tax (collected from producers) on equilibrium price.
  - Effect of marginal increase in consumption tax (collected from consumers) on equilibrium price.
  - Burden of tax on producers and on consumers does not it depend on whether it's sales tax or consumption tax.

- The budget constraint.
  - Consumption bundles.
  - The budget line.
  - The budget constraint or the budget set.

- Changes to the budget constraint.
  - Rotation of the budget line.
  - Convex (coupons) and concave (discounts) kinks to the budget line.
  - Parallel shifts of the budget line.
  - Budget line through endowment bundle.

- Consumer preference through ranking of pairs of bundles.
  - Rational preferences: completeness and transitivity of pairwise ranking.
  - Monotonicity.
  - Convexity.

- Consumer preference through indifference curves.
  - Indifference curve through every bundle.
  - No crossing of two indifference curves.
  - Direction of increasing preferences.
  - Convex to the origin.

- Consumer preference through utility function.
  - Greater (smaller) value of utility function represents more (less) preferred, and equal value represents indifference.
  - Preference represented by utility function is rational.
  - Increasing transformations of utility function represent same preference.

- Marginal rate of substitution.
  - Marginal rate of substitution as slope of indifference curve: derivation.
  - Convexity of preference and diminishing marginal rate of substitution.
  - Marginal rate of substitution for perfect complements and perfect substitutes.

- Marginal rate of substitution across indifference curves.
  - Cobb-Douglas: Same marginal rate of substitution for all bundles with a fixed ratio.
  - Quasi-linear: Same marginal rate of substitution for all bundles with a fixed quantity of the "nonlinear" good.

- Consumer choice problem.
  - Objective is to maximize utility.
  - Choice variable is consumption bundle.
  - Constraint is budget set.

- Optimality condition for an interior consumption bundle to solve consumer choice problem.
  - Ratio of marginal utility to price is equated across goods at the solution.
  - Equivalent condition: marginal rate of substitution at the solution equals price ratio.
  - Heuristic derivation.
  - Graphical derivation.

- Deriving optimality condition using Lagrange method.
  - Lagrange multiplier and Lagrange function.
  - First order conditions for solution to consumer choice problem.
  - Optimality condition.
  - Meaning of Lagrange multiplier.

- Solving consumer choice problem (short cut).
  - Applies when indifference curves do not have kinks or line segments (for example, Cobb-Douglas).
  - Solution satisfies optimality condition.
  - Solution is on the budget line.
  - Find solution from above two conditions.
  - Make sure solution is interior.

- Corner solutions to consumer choice problem.
  - Solution via short cut is invalid if it not feasible.
  - Use the heuristic derivation of optimality condition to argue for a corner solution.
  - Example: consumer choice with quasi-linear preference.

- Solutions to consumer choice problem without calculus.
  - Perfect complements: solution is found at the kink of an indifference curve on the budget line, regardless of the price ratio.
  - Perfect substitutes: solution is found at one corner of budget line that reaches the highest indifference line.

- Income elasticity of demand.
  - Quantifying income effect on consumer demand.
  - Deriving income elasticity of demand, by first deriving consumer demand function.
  - Normal good versus inferior good.
  - Relate income elasticity to income effect on share of consumption expenditure.

- Graphical decomposition of effect of a price increase on the demand for the good.
  - Negative substitution effect.
  - Income effect can be either negative (normal good), or positive (inferior good).
  - Ordinary good vs Giffen good.

- Expenditure minimization problem.
  - Objective is to minimize expenditure.
  - Choice variable is consumption bundle.
  - Constraint is to achieve a target utility level.
  - Solution is called compensated demand, and is used to quantify substitution effect.

- Solve expenditure minimization problem using short cut.
  - Same optimality condition as before: marginal rate of substitution equals the price ratio.
  - Solution achieves target utility level.
  - Find solution from above two conditions.

- Income tax vs consumption tax.
  - For same tax revenue, compare after tax bundles and after tax budget lines.
  - Consumers prefer income tax to consumption tax, as after-consumption tax bundle lies on after-income tax budget line.
  - Argument does not require us to derive the consumer demand.

- Consumer surplus.
  - A rough measure of consumer welfare in monetary terms, but equally applicable at individual and market levels.
  - Change to consumer welfare gives a rough measure of impact of a price change on consumer welfare.

- Compensating variation and equivalent variation.
  - Two precise measures of changes to consumer welfare, using compensated demand function.
  - Compute the two measures for given utility functions: Quasi-linear, Cobb-Douglas.

- Revealed preference
  - Observing a consumer choosing some bundle at a price vector reveals consumer prefers the chosen bundle to all bundles that cost less at observed prices.
  - Weak axiom of revealed preference (WARP): minimum requirement for rationality that allows for inferences of consumer preferences from consumer choice data.
  - Systematic checking for consistency with WARP.

- Use a revealed-preference argument to show substitution effect is negative.
  - A price increase in one good necessarily causes decrease in consumption of this good for consumer to reach the same utility level.
  - Argument does not require derivation of compensated demand.

- Model of uncertainty.
  - A list of possible states of world.
  - A corresponding list of probabilities of the states – all non-negative numbers that sum up to 1.
  - Uncertainty and risk are interchangeable here.

- State-contingent bundle.
  - Under uncertainty, a consumer choice associates each state with a quantity of a single consumption good (money).
  - A state-contingent bundle consists of the list of quantities and the list of probabilities.
  - Quantities of the good across different states are never "consumed" at the same time.
  - If a choice leads to the same quantity for all states, it has no risk.

- Choice under uncertainty.
  - Consumer has a uni-variate utility function.
  - For any state-contingent bundle, consumer evaluates it by computing the expectation of the utility function, or the expected utility.
  - Between any two state-contingent bundles, consumer chooses the one with a greater expected utility.

- Preference under uncertainty.
  - Preference under uncertainty is captured by the utility function.
  - Multiplying any utility function by a positive constant and add another constant, we will get another utility function that represents the same preference.

- Different preferences uncertainty.
  - Risk neutrality: linear utility function, or constant marginal utility.
  - Risk aversion: concave utility function, or decreasing marginal utility.
  - Risk loving: convex utility function, or increasing marginal utility.

- Comparing risk aversion.
  - Certainty equivalent and risk premium.
  - For risk neutral consumers, certainty equivalent of any state-contingent bundle is equal to its expected value, and risk premium is zero.
  - For the same state-contingent bundle, a more risk-averse consumer has a smaller certainty equivalent and a greater risk premium.

- Optimal investment under uncertainty: direct approach.
  - An unconstrained problem of choosing investment to maximize expected utility.
  - Optimal investment is strictly positive if expected net return is positive, because expected utility is increasing at zero investment.

- Optimal investment: indirect approach.
  - Construct “budget line" by writing wealth in one state as function of wealth in the other state.
  - Optimality condition is marginal rate of substitution between wealth in the two states is equal to slope of budget line.
  - Use the budget line and optimality condition to find optimal investment.

- Optimal insurance.
  - Direct approach: unconstrained problem of choosing insurance quantity to maximize expected utility.
  - Indirect approach: construct the budget line and use optimality condition.
  - Optimal insurance achieves full insurance if insurance policy is actuarially fair (makes zero expected profit), and partial insurance if insurance policy is unfair (makes positive expected profit).

Lecture 5. Producer Behavior

- Model of Producer.
  - Feasible choice set: all production plans that satisfy a production function.
  - Objective: maximize profit, difference between revenue and cost.
- Production function with capital and labor.
  - Marginal products of capital and of labor.
  - Diminishing marginal products.

- Isoquants.
  - Slope: marginal rate of technical substitution, equals ratio of marginal products.
  - Shape: monotonicity and convexity.
  - Expansion: increasing, constant, and decreasing returns to scale.

- One-step approach to profit maximization.
  - Choose input mixes and use the production function: unconditional factor demand functions.
- Two-step approach to profit maximization.
  - For fixed output target, cost minimization by choosing input mix: conditional factor demand functions, cost function.
  - Profit maximization by choosing output, using the cost function derived from first step.

- Short run cost minimization: can only choose one factor out of two.
  - Short run conditional factor demand function, and short run cost function.
  - Marginal cost, average cost and average variable cost.
  - Marginal cost meets average cost and average variable cost at their minimum, and from below.

- Long run cost minimization: choose both factors.
  - Optimality condition.
  - Long run conditional factor demands, and long run cost function.
  - Homogeneity of factor demand and cost functions.
  - Expansion path.

- Short run profit maximization by a competitive firm.
  - Output rule: if produce at all, choose quantity to equate marginal variable cost to output price.
  - Shut down rule: don't produce if output price is below minimum average variable cost.
  - Profit may be negative in short run.

- Long run profit maximization by a competitive firm.
  - Output rule: if produce at all, choose quantity to equate marginal cost to output price.
  - Shut down rule: don't produce if output price is below minimum average cost.

- One-step approach to profit maximization by competitive firm.
  - Optimality condition.
  - Unconditional factor demand functions.

- Market supply.
  - Short run supply: sum up individual short run supply curves.
  - Long run supply: firms can exit or enter, leading to zero profit and a flat supply curve at the long run minimum average cost.

- Market equilibrium.
  - Short run equilibrium: market demand curve meets short run market supply curve.
  - Long run equilibrium: market demand curve meets flat long run supply curve, and determines number of firms in the long run.

- Efficiency of partial equilibrium.
  - Consumer surplus.
  - Producer surplus.
  - Equilibrium maximizes sum of consumer surplus and producer surplus.
  - Deadweight loss of price floor and price ceiling.

- Edgeworth box.
  - Endowments.
  - Preferences.
  - Resource constraints, and feasible allocations.
  - Budget constraints.
- Mutually beneficial trade.
  - Mutually acceptable allocations.

- Contract curve.
  - Pareto efficient allocations.
  - Contract curve: Pareto efficient allocations in Edgeworth box.
  - Deriving contract curve, by maximizing one consumer's utility subject to reaching a target utility level of the other consumer: optimality condition.
- Core: allocations that are both mutually acceptable and Pareto efficient.

- General equilibrium in Edgeworth box.
  - Excess demand and excess supply.
  - Equilibrium: both markets clear.
  - Walrus' law.
  - Finding equilibrium in Edgeworth box.

- First welfare theorem.
  - Proof of first welfare theorem in Edgeworth box using revealed preferences.
  - Proof of first welfare theorem in Edgeworth box using contract curve.
- Second welfare theorem.

- Production possibility frontier for two goods.
  - Slope: marginal rate of transformation.
  - Comparing slopes of different producers: comparative advantage, expansion of joint frontier.
  - Joint production possibility frontier over more than one producer using comparative advantage: concave towards origin.

- Efficiency of general equilibrium with production.
  - Consumption efficiency: allocation of already produced goods is Pareto efficient.
  - Production efficiency: there is no other product mix on the production possibility frontier that gives consumers greater utility.

- Competitive equilibrium with two producer-consumers.
  - Profit maximization with two outputs, one input, and constant marginal rate of transformation.
  - Utility maximization with two goods and profits from production as income.
  - Market clearing: total consumption of each good equals to total output.

- Consumer surplus and producer surplus for two economies.
  - No trade.
  - Free trade.
  - Trade with import tariff.
  - Trade with import quota.