Economic Analysis of Law

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Lecture 1: Consumer and Producer Theory

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Review of Microeconomics: Introduction

- Microecnomics is a field which studies
  - (1) how individual consumers make consumption (purchasing) choice, given budget and prices of commodities;
  - (2) how individual firms make production plan, given prices of inputs, price of output, and technology,
  - (3) how the price of every good in market is determined, given (1) and (2).

Review of Microeconomics: Introduction

- Two postulates:
  1. Consumers make consumption (purchasing) decision to maximize satisfaction (later called "utility"), given the above-mentioned constraints of budget and prices.
  2. Firms make production plan to maximize profit, again given the above-mentioned constraints on prices and technology.

Basic Consumer Theory: Preference and Utility

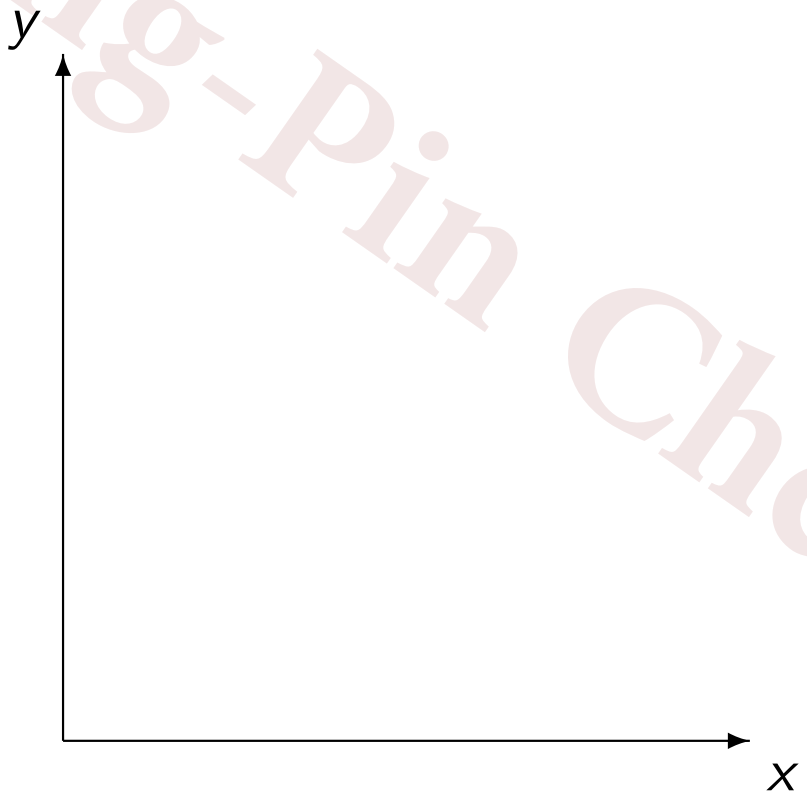
- Assume that every consumer is able to rank every bundle of goods according to certain preference.
- Assumptions:
  1. Completeness: Consumer can rank between *any* two bundle of goods A and B.
  2. Transitiveness: If a consumer prefers A to B and also prefers B to C, then it must be the he prefers A to C.
  3. Reflexivity: Any bundle is as good as itself.
- Important theorem in microeconomics: If the consumer's preference is transitive, complete, and reflexive, then his preference can be represented by a utility function.

Basic Consumer Theory: Preference and Utility

- A utility function is a function which assigns a number to any bundle of good the consumer might purchase. The greater this number, the more the consumer prefers the bundle.
- Examples:
  1. Two goods: cake and a pizza.
  2. y and x, quantities of cake and pizza.
  3. $u(y, x) = y + x$.
     $u(y, x) = yx$.
- We will maintain the two-good case through out this section.
- We will also assume that quantity is continuous, i.e., goods are infinitely divisible.

Basic Consumer Theory: Preference and Utility

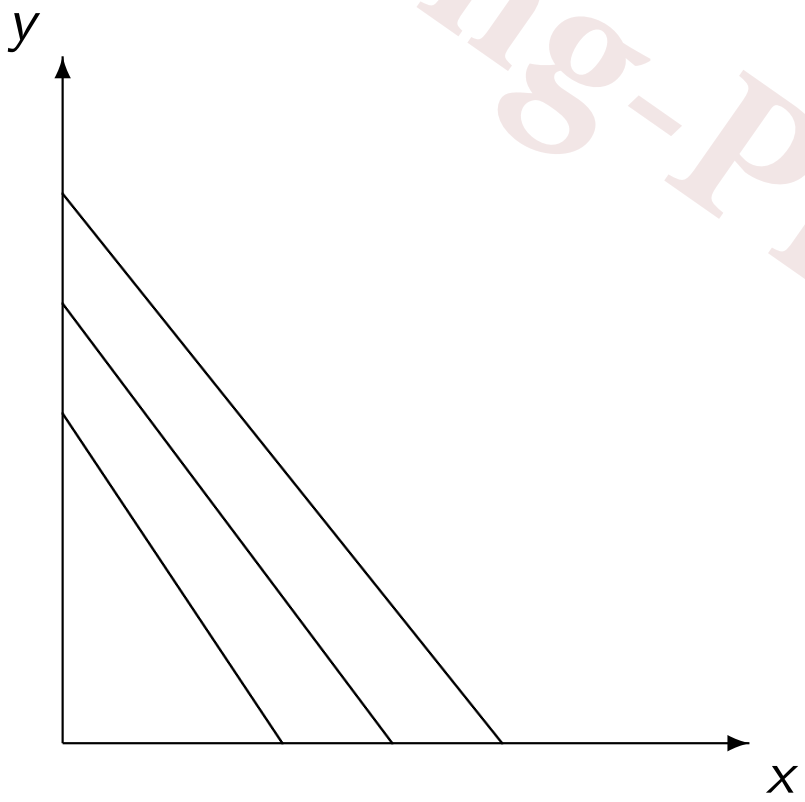
- It is convenient to analyze the consumer's preference (or equivalently, utility) by graphs: horizontal axis is quantity of pizza, and vertical axis is quantity of cake.



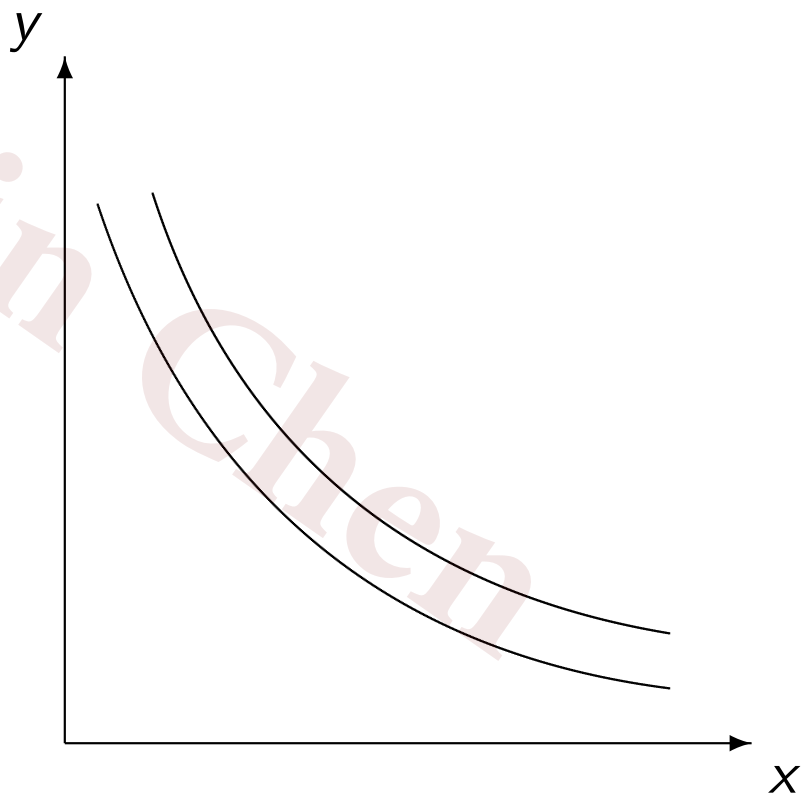
Basic Consumer Theory: Preference and Utility

- An <u>indifference curve</u> is a combinations of all y's and x's on the graph which give the consumer the same value of utility.

$$u(y, x) = y + x$$



$$u(y, x) = yx$$



Basic Consumer Theory: Preference and Utility

- Properties of the Indifference Curves:
  (1) Higher utility for curve more upper-right: Goods are desirable.
  (2) Negatively sloped: Goods are substitutes.
  (3) Convexed to the orgin: Decreasing marginal rate of substitution (MRS).
  (4) Indifference curves do not cross each others.
- MRS: The quantity of a good to be increased, when the quantity of another good is decreased by one unit, in order to main the same level of utility.
- Decreasing MRS thus means that as the consumer has less of a good, he values it more against the other good.

- MRS is essentially the (absolute value of the) slope of the indifference cure.

  (1) $u(y, x) = yx$:

  MRS$=\frac{y}{x}$.

  MRS is increasing in this example.

- Examples:

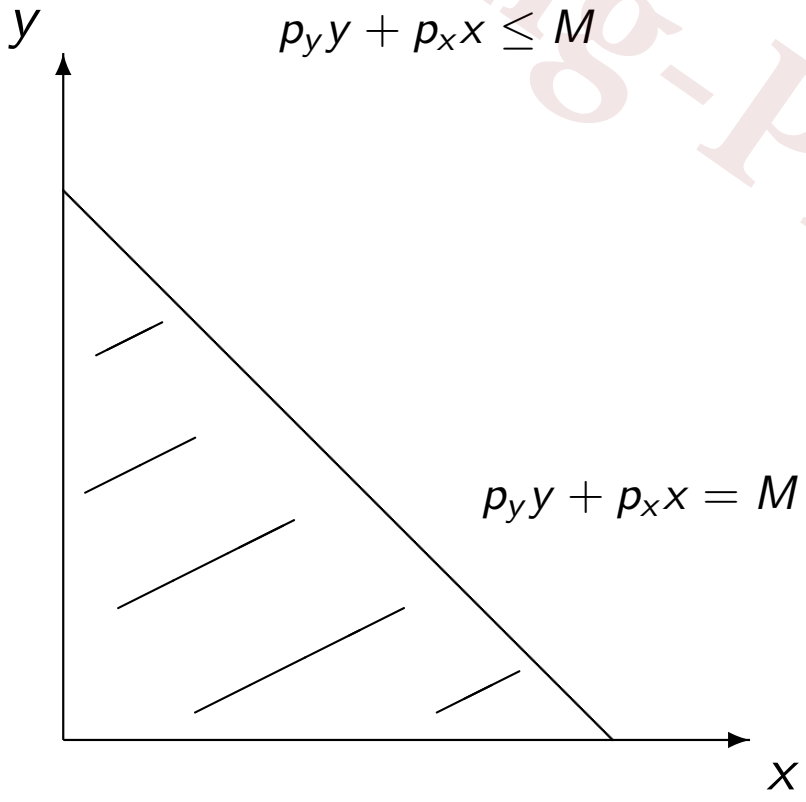
  (2) $u(y, x) = y + x$:

  MRS$=1$.

Basic Consumer Theory: Budget

- Assume the consumer has a fixed budget of M under his disposal.
- The prices of y and x are p_y and p_x, respectively.
- Then the <u>budget set</u> of the consumer is (y, x)'s such that

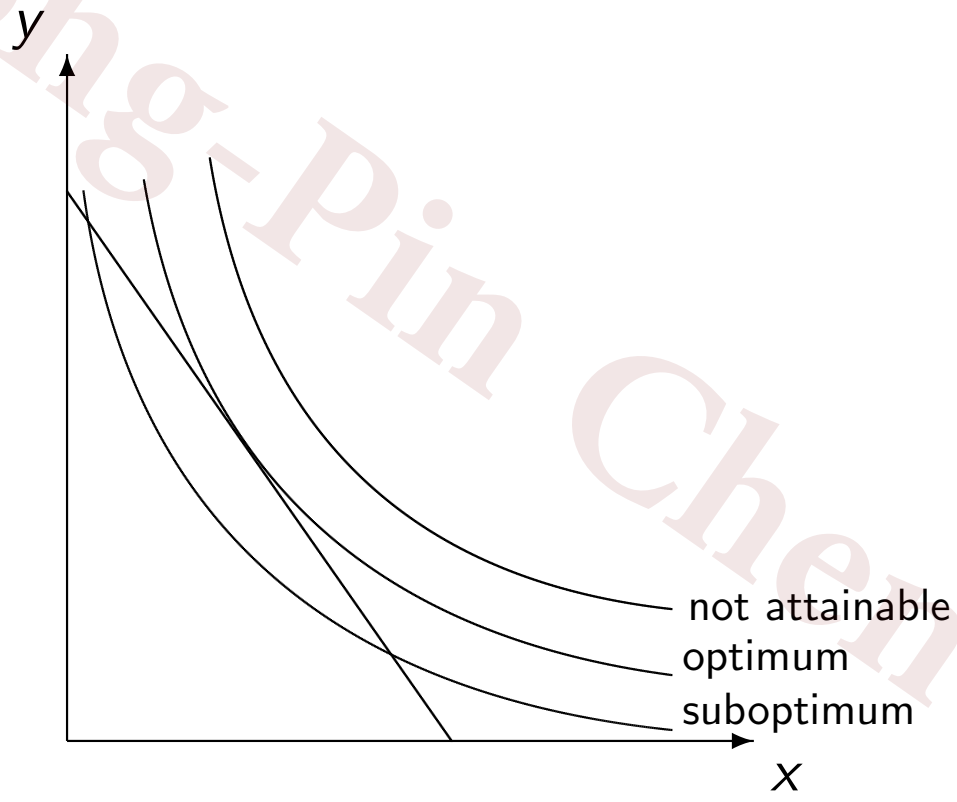
$$p_y y + p_x x \leq M$$



- The (absolute value of) slope of the budget set frontier is p_x/p_y.
- The shaded region is all consumptions that are possible for the consumer, given prices and budget.

Basic Consumer Theory: The Optimum

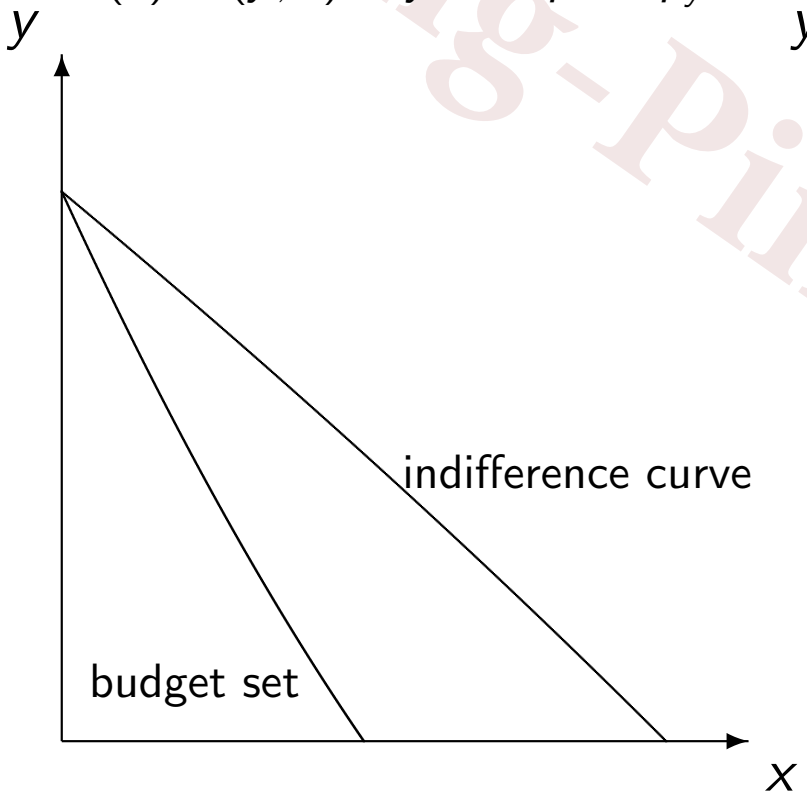
- Under our Postulate 1 (see page 3 of slide), the consumer will choose a consumption bundle in the budget set to maximize utility.



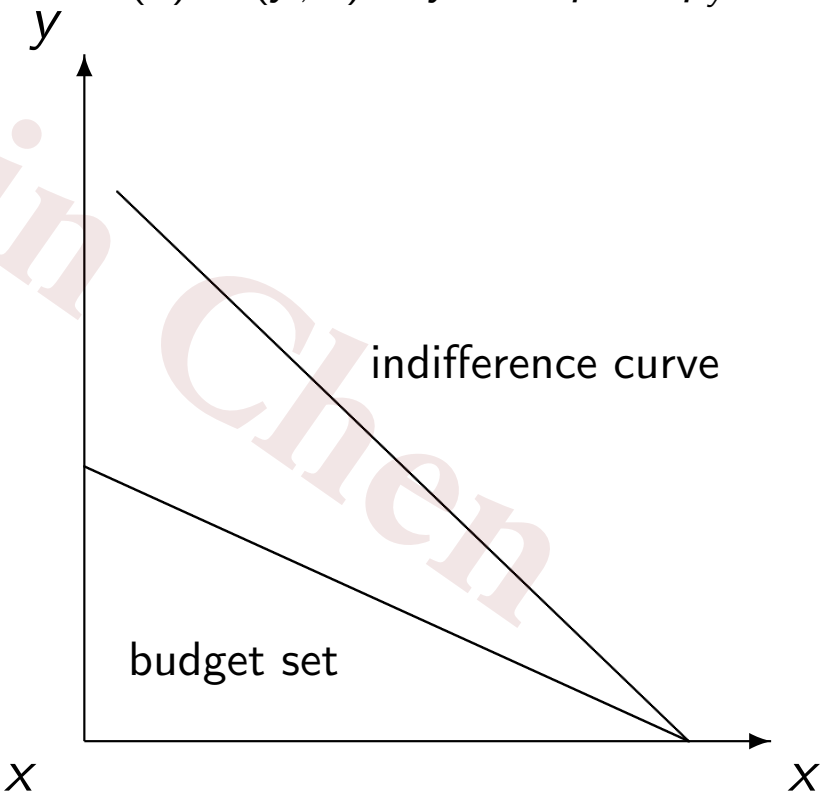
Basic Consumer Theory: The Optimum

- At the optimum, MRS = slope of budget set frontier. That is, MRS$=\frac{p_x}{p_y}$.
- Examples:

(1). $u(y,x) = y + x$; $p_x > p_y$

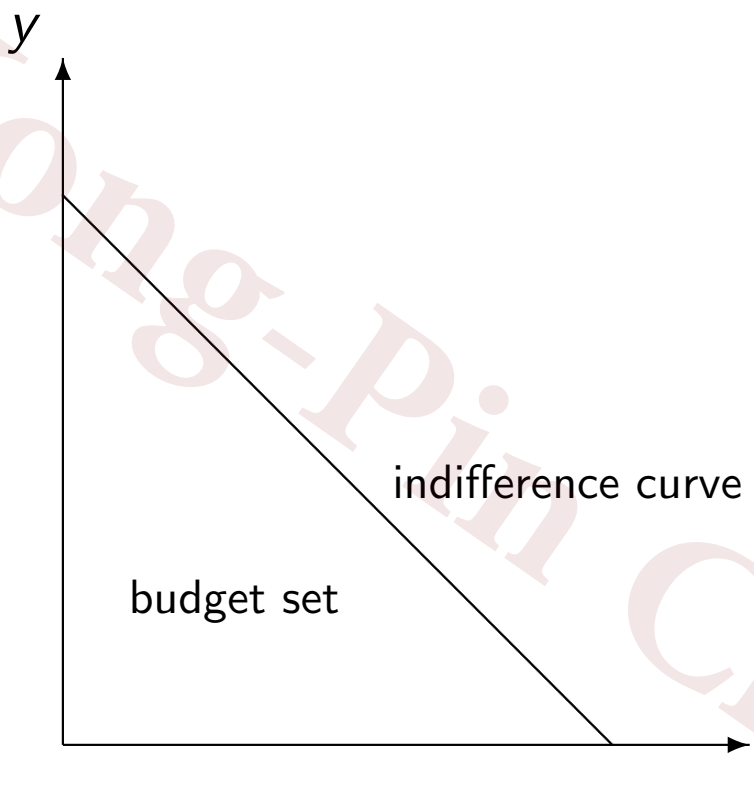


(2). $u(y,x) = y + x$; $p_x < p_y$

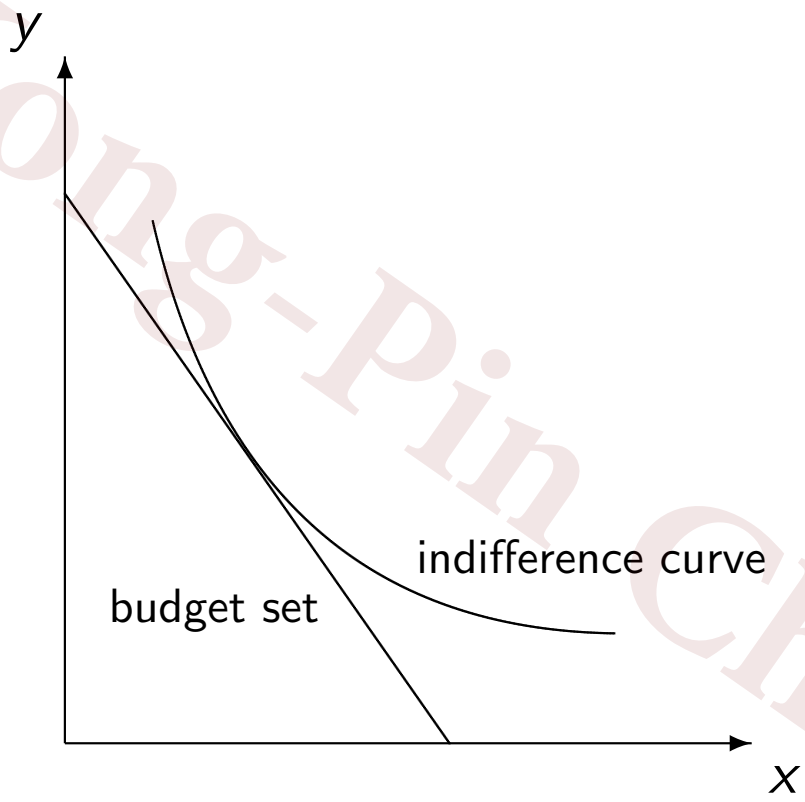


Basic Consumer Theory: The Optimum

(3). $u(y, x) = y + x$; $p_x = p_y$



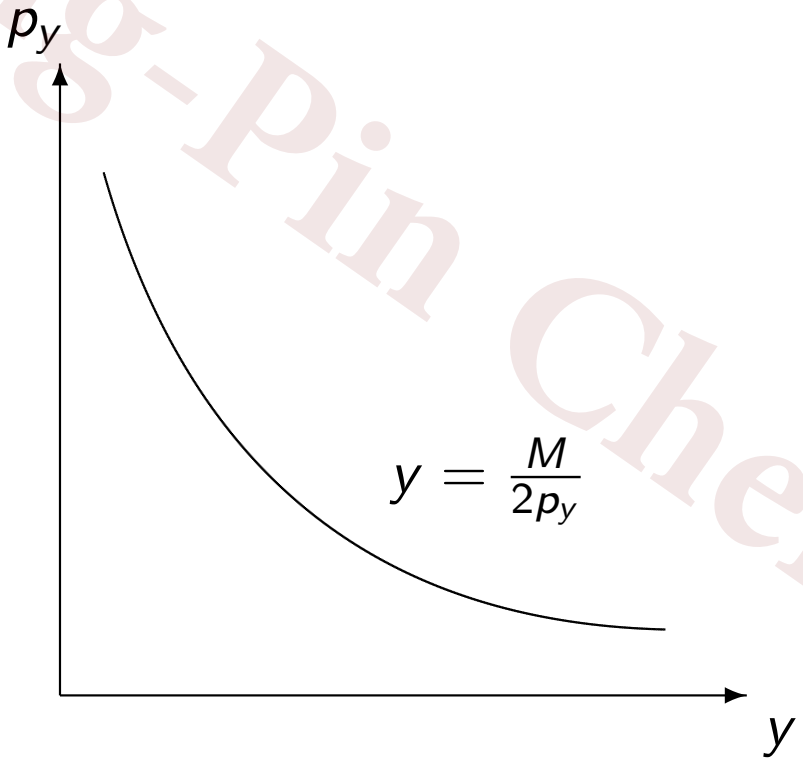
(4). $u(y, x) = yx$:



$$\frac{p_x}{p_y} = \frac{y}{x},\ p_y y + p_x x = M. \quad y = \frac{M}{2p_y},\ x = \frac{M}{2p_x}.$$

Basic Consumer Theory: Demand Function

- By solving for the optimum consumption, given prices and budget, we can derive the <u>demand function</u> of the consumer.
- Example: $u(y, x) = yx$.



Basic Consumer Theory: Demand Function

- $y(p_y;\ p_x, M)$ and $x(p_x;\ p_y, M)$ are demand functions for y and x, respectively.
- Demand function is almost always downward sloping. Exception: Giffen good.
- Aggregate demand function is the horizontal sum of all individual demands.

Basic Consumer Theory: Price Elasticity

- Price elasticity of demand measures the change of quantity demanded in response to change in price.
- $e = -\frac{\text{\% changes is quantity demanded}}{\text{\% price change}} = -\frac{\frac{\Delta q}{q}}{\frac{\Delta p}{p}} = \frac{\Delta q}{\Delta p}\frac{p}{q}$.

- Example

Long-Run and Short-Run Price Elasticities

	ELASTICITY	
Good	Short-run	Long-run
Gasoline, oil	0.14	0.48
China, glassware	1.34	8.80
Alcohol	0.90	3.63
Movies	0.87	3.67
Bus Travel (local)	0.77	3.54
Bus Travel (intercity)	0.20	2.17
Air Travel (foreign)	0.70	4.00
Rail Travel (commuter)	0.54	1.70
Natural gas (residential)	0.15	10.70
Electricity (residential)	0.13	1.90
Newspapers, magazines	0.10	0.52

The table is taken, in part, from Heinz Kolher, *INTERMEDIATE MICROECONOMICS: THEORY AND APPLICATIONS* (3d ed. 1990).

Basic Firm Theory: Production

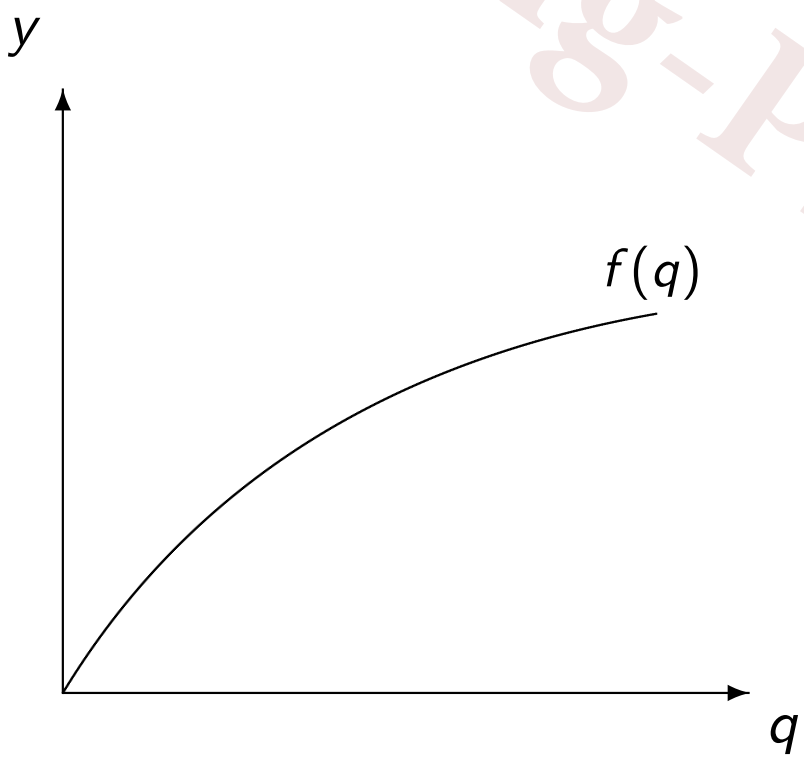
- Each firm is endowed with a production function which maps input to output.
- Example:

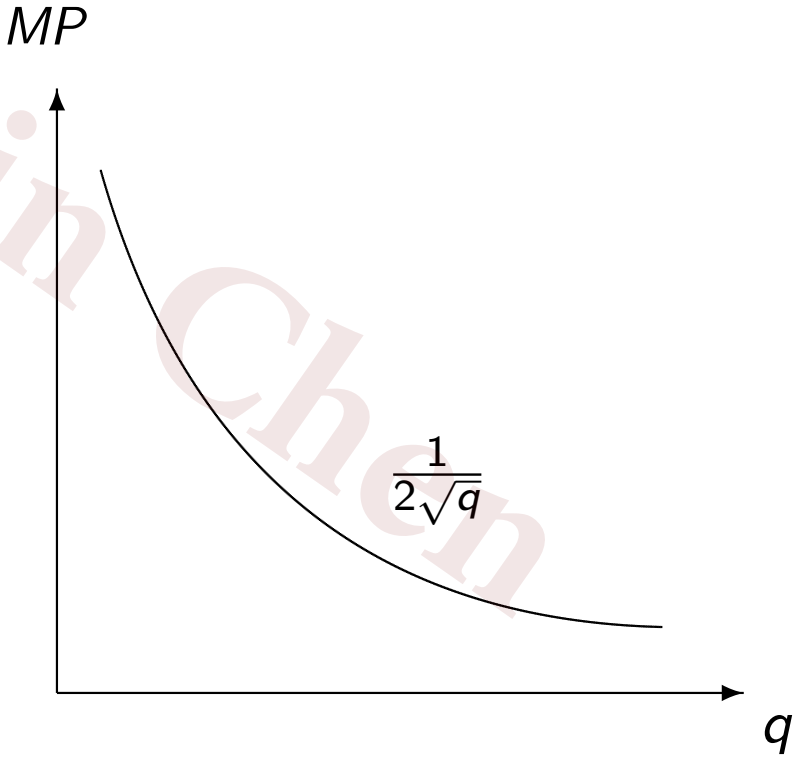
$$y = f(q);$$

  where q is quantity of input and y is quantity of output.
- f is assumed to be increasing.
- Marginal product (MP): The increase in output for one unit of increase in input.
- $MP = \Delta y / \Delta q$.

Basic Firm Theory: Production

- MP is assumed to be decreasing. This is a phenomenon called diminishing marginal product.
- Example: $y = \sqrt{q}$.





Basic Firm Theory: Profit Maximization

- The firm's profit is

$$p_y y - wq = p_y f(q) - wq;$$

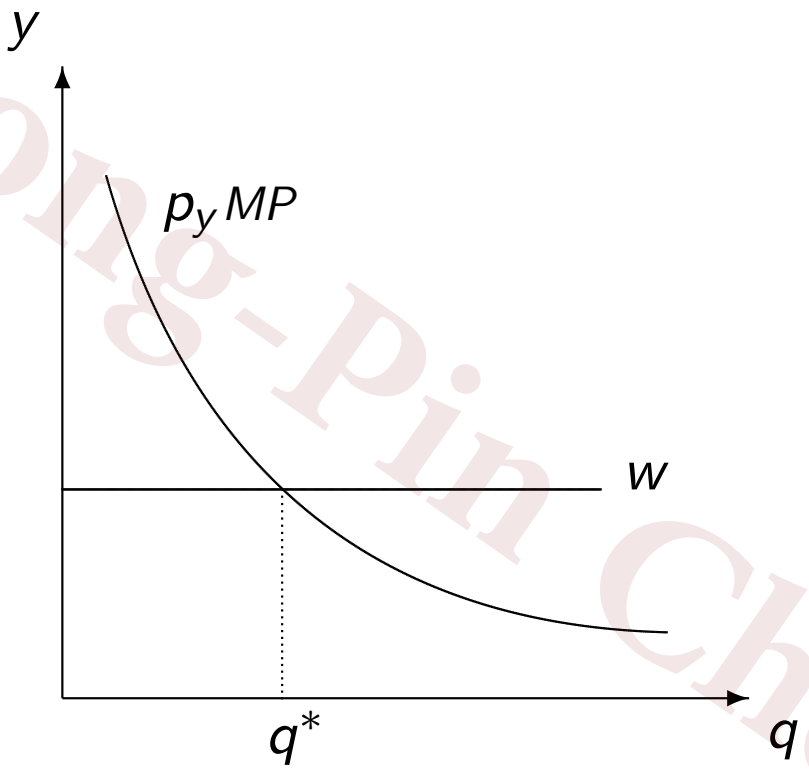
where p_y and w are prices of output and input, respectively.

- Postulate: The firm chooses the level of input to maximize profit.
- That means the firm will choose q so that

$$p_y MP = w.$$

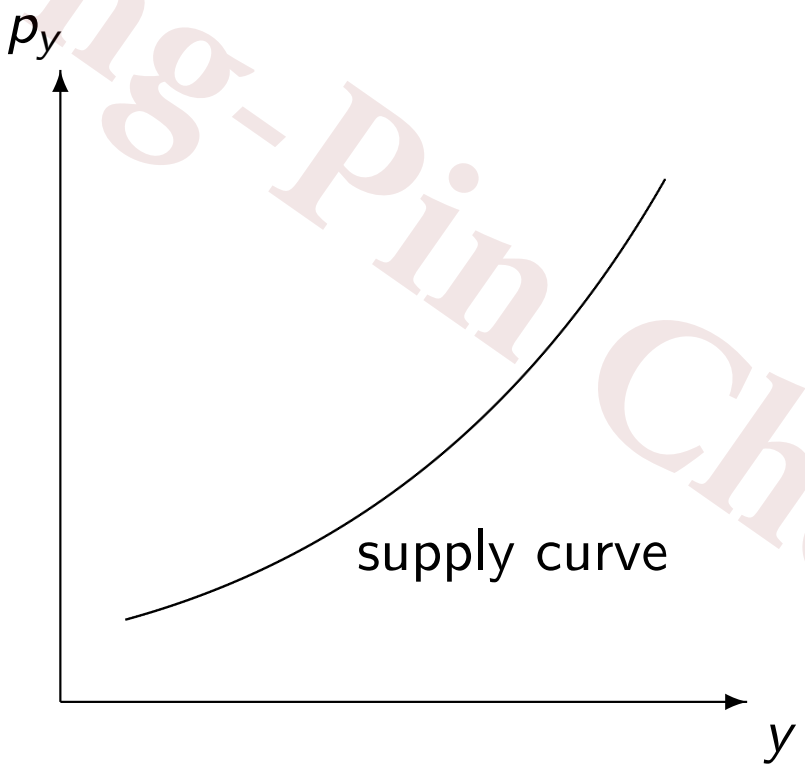
- Left-hand side is benefit; right-hand side is cost.

Basic Firm Theory: Profit Maximization



Basic Firm Theory: Supply Function

- Note that q^* increases in p_y. Therefore $y = f(q^*)$ also increases in p_y:



Basic Firm Theory: Supply Function

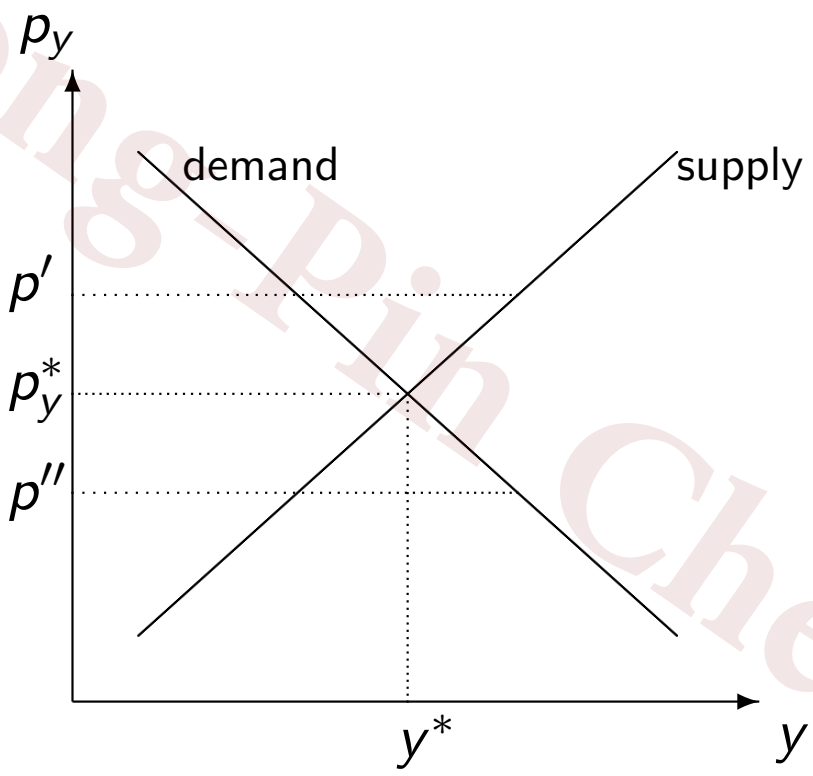
- We will write $y(p_y)$ as the supply function of the firm.
- If there are many firms, the total supply, or market supply function, is the horizontal sum of all individual supply functions.

Market Equilibrium of a Competitive Market

- Competitive market: The market in which the buyers and sellers take price as given. That is, no one has the power to change market price by unilateral action.
- In our context, every buyer and seller take p_y as given.

Market Equilibrium of a Competitive Market

- In competitive market, price and quantity are determined by supply and demand:



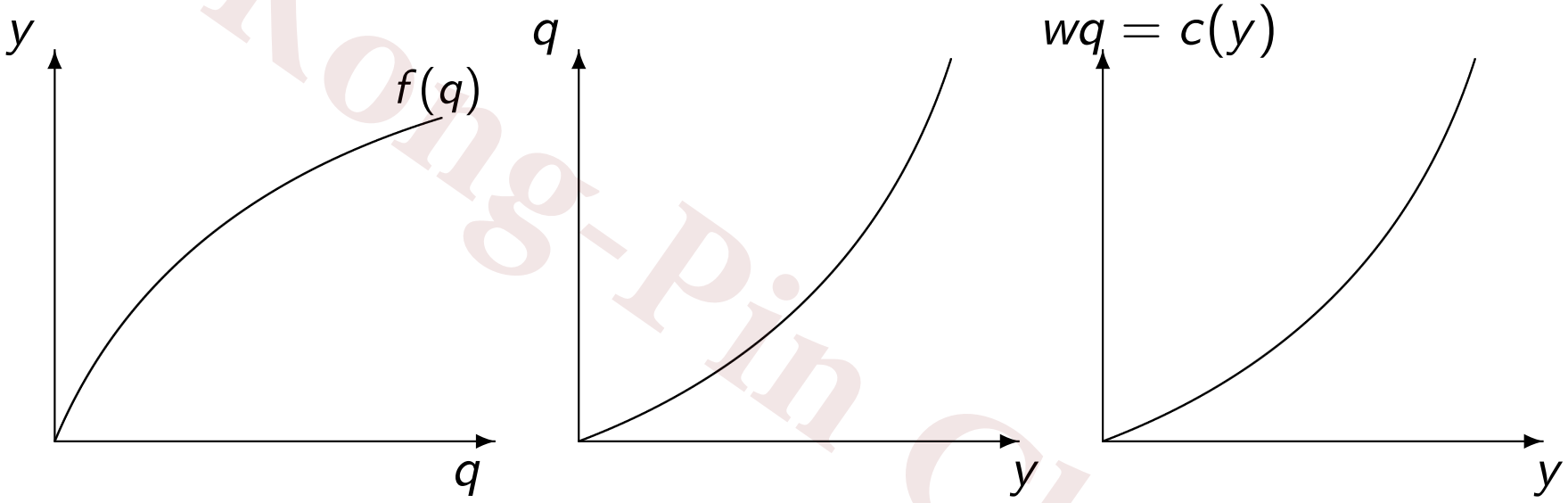
- There is <u>excess supply</u> at price p' and <u>excess demand</u> at price p''.

Market Equilibrium: Monopoly

- If there is only one firm supplying a good, that firm is called a monopolist.
- Price will change as monopolist changes output. That is, a monopolist does not take price as given when it decides how much to produce.
- However, it cannot determine <u>both</u> price and quantity.
- The monopolist chooses an output on the market demand function to maximize profit.

Market Equilibrium: Monopoly

- Recall the term wq in equation (1) wq is the <u>cost</u> of production.



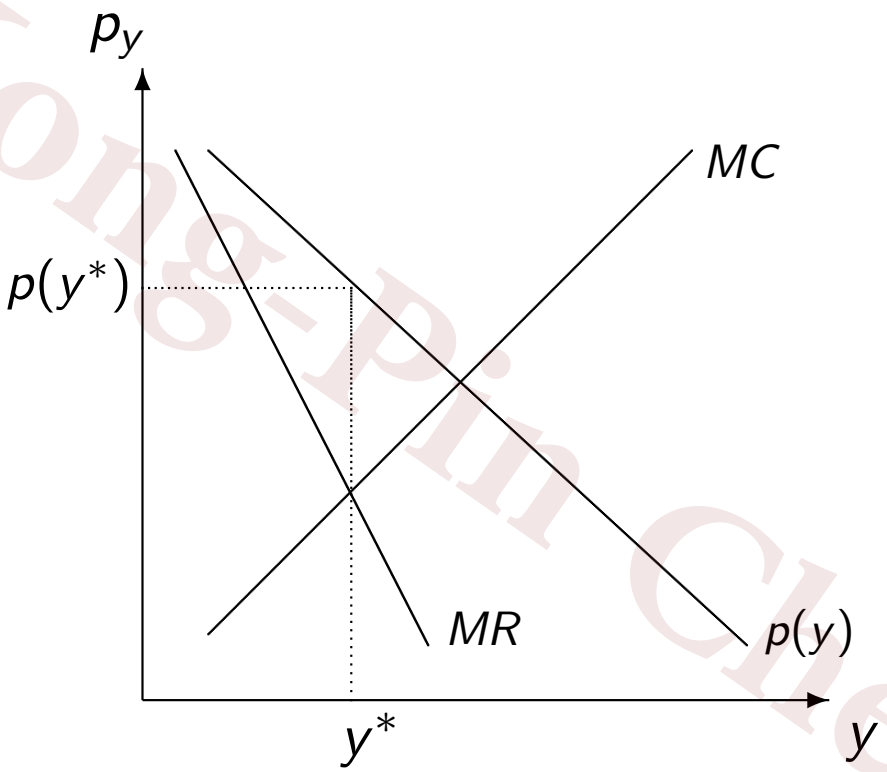
- The figure on the right is cost (wq) as a function of output y. We write wq is $c(y)$.
- $c(y)$ is the <u>cost function</u>.

Market Equilibrium: Monopoly

- First, two terminologies:
- Marginal revenue (MR) is the increase in the firm's revenue when it increases output by one unit: $MR = \Delta py/\Delta y$.
- Marginal cost (MC) is the increase in the firm's cost when it increases output by one unit. $MC = \Delta c/\Delta y$.
- MR is decreasing while MC is increasing in y.

Market Equilibrium: Monopoly

- The firm maximizes profit at an output level y where $MC = MR$:



- y^* is profit-maximizing output; $p(y^*)$ is price.
- Monopolistic output is less than social optimum.

Decision-Making under Risk

- In this section we consider only utility on money.
- Many decisions involve outcomes which are not certain. Examples
  - (i) Buying lottery.
  - (ii) Investment.
  - (iii) Taking examination.
  - (iv) Career decision.
- In many cases, the probabilities of possible outcome are known. This is the case of decisions involving risks.
- In decisions under risks, decision-makers need to compute expected utility.

Two-Outcome Example

- Suppose there are two possible outcomes of an investment plan I_1. One is making a profit of \$400, the other losing \$50.
- The probability of making \$400 profit is p.
- The <u>expected value</u> of investment I_1 is then

$$p \cdot 400 + (1 - p) \cdot (-50) = 450p - 50.$$

- The <u>expected utility</u> of investment I_1 is

$$pu(400) + (1 - p)u(-50)$$

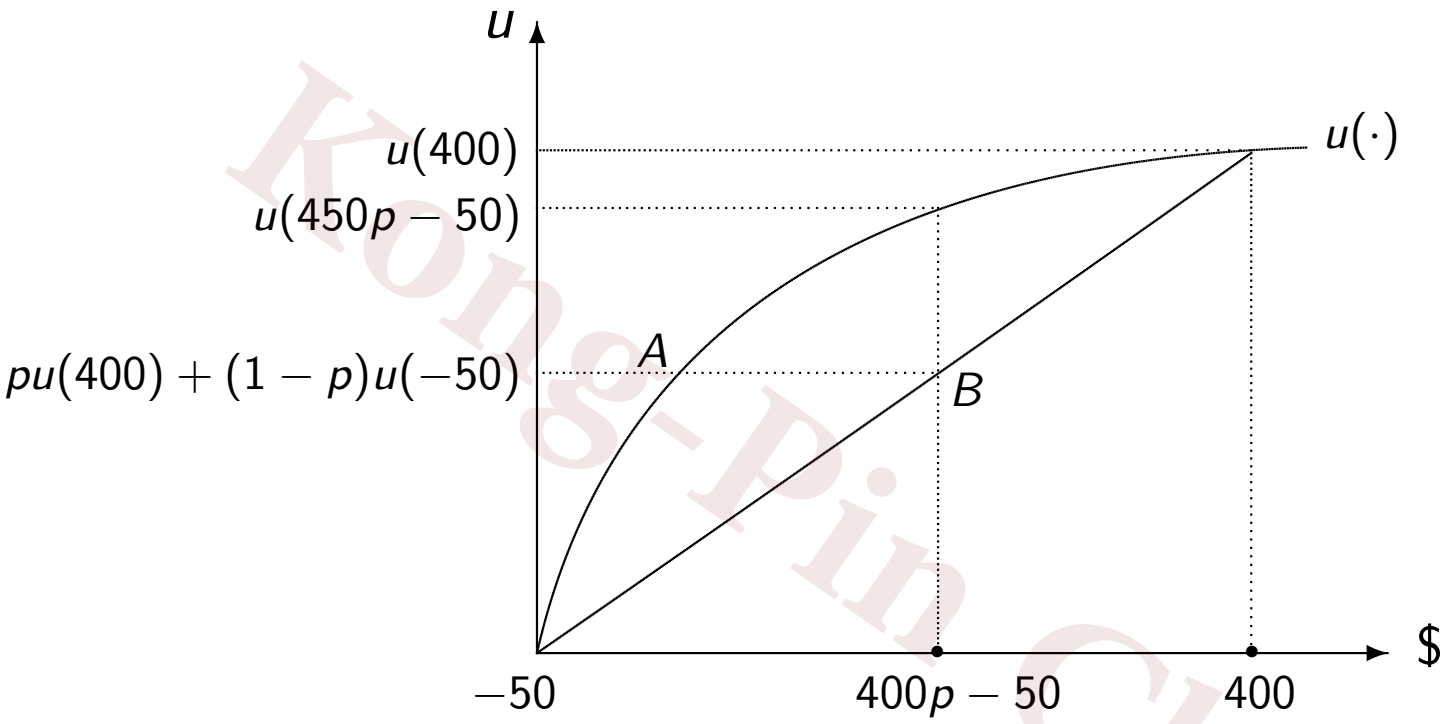
Two-Outcome Example

- Suppose there is another investment plan I_2, which yields \$200 for sure.
- How do an investor chooses between I_1 and I_2?
- Crucially depends on (i) the value of p and (ii) the investor's risk attitude.

Risk Aversion

- Let's call an action (or decision) involving risks a lottery.
- Definition: A consumer is risk-averse if he prefers to receive the expected value of a lottery for certainty than the lottery itself. That is, the expected utility of a lottery is smaller than the utility of the expected value of lottery.
- The consumers (or investors or firms) are usually assumed to be risk-averse.
- In the previous example, this means that $pu(400) + (1-p)u(-50)$ is less than $u(450p - 50)$.

Risk Aversion



- The greater the <u>curvature</u> of the utility function, the more risk-averse is the consumer.

Insurance

- The consumer is willing to pay up to an amount equal to $\overline{AB}$ to avoid the risk. This amount is called risk premium.
- Consumer's risk-aversion gives rise to insurance.
- The firm, which is generally less risk averse than the consumer (and is usually assumed to be risk-neutral because of its ability to diversity), can sell insurance to the consumer. Note that both gain from this transaction.