Consumer Choice

From utility to demand

Scarcity and constraints

- Economics is about making choices.
  - Everything has an opportunity cost (scarcity):
    - You can't always get what you want.
- For consumers, money (income, wealth) is scarce.
  - There is a constraint on consumers' actions: a *budget constraint*.
    - How do consumers spend their money (income, wealth)?
    - Spending money on one good means giving up buying some other good (opportunity cost).

Making buying decisions

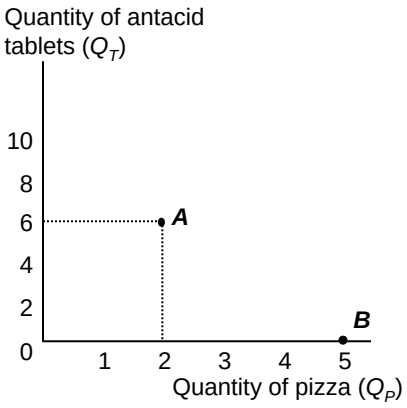
- How do consumers make decisions about buying goods?
  - Firms are interested in doing what gives them the most profit.
  - Consumers are interested in doing what gives them the most … utility.
    - *Utility* is a measure of satisfaction.
    - Bentham: “Balance of pleasure over pain”

Making buying decisions

- From all the possible *consumption bundles* of good, a consumer will choose the bundle that gives her the most utility.
  - A *consumption bundle* lists the quantities of all the goods a consumer could consume.
    - Example:
      - (2 slices of pizza, 6 antacid tablets), or
      - (2, 6) for short if those are the only two goods
      - (Q_P, Q_T) to be general

Consumption bundles

- Graphically:



Bundle *A*: (2, 6)

Bundle *B*: (5, 0)

What you want … and can get

- From all the possible consumption bundles of good, a consumer will choose the bundle that gives her the most utility.
  - This means we need to study two things:
    - What consumption bundles are possible?
      - That is, what is the budget constraint?
    - What gives the consumer utility?
  - Then we put those two together.

Consumption Possibilities

You can't always get what you want.

Consumption possibilities

- Example:
  - Income (N) = \$10
  - Price of pizza (P_P) = \$2 per slice
  - Price of antacid tablet (P_T) = \$1 per tablet
- Which of the following consumption bundles – remember the format (Q_P, Q_T) – are affordable?
  - (2, 6) Expenditure: 2 · \$2 + 6 · \$1 = \$10 ✓
  - (5, 0) Expenditure: 5 · \$2 + 0 · \$1 = \$10 ✓
  - (1, 1) Expenditure: 1 · \$2 + 1 · \$1 = \$3 ✓
  - (3, 5) Expenditure: 3 · \$2 + 5 · \$1 = \$11 ✗

Consumption possibilities

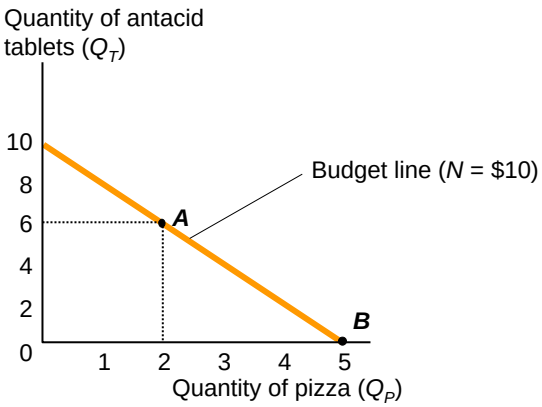
- With a given income, some consumption bundles are affordable, and others are not.
  - All affordable consumption bundles are in the set of *consumption possibilities*.
- But some of these don't make sense!
  - The (simplified, unrealistic) framework which we will study is a one-shot framework in which there are only two goods.
  - Not spending <u>all</u> your income is stupid.

Consumption possibilities

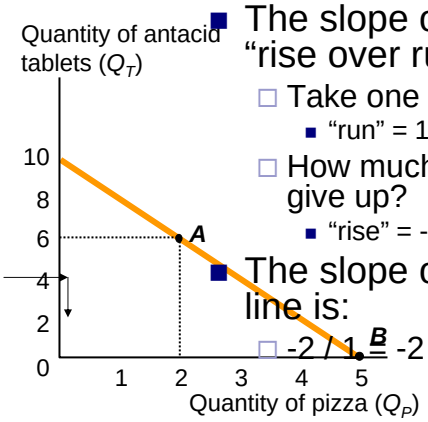
- Which consumption bundles are <u>just</u> affordable (example)?
  - $Q_P \cdot \$2 + Q_T \cdot \$1 = \$10$
  - This is the *budget line*.
- Suppose $Q_P = 0$:
  - $0 + Q_T \cdot \$1 = \$10$
  - $Q_T = 10$
- Suppose $Q_T = 0$:
  - $Q_P \cdot \$2 + 0 = \$10$
  - $Q_P = 5$

- Which consumption bundles are <u>just</u> affordable (general)?
  - $Q_P \cdot P_P + Q_T \cdot P_T = N$
  - This is the *budget line*.
- Suppose $Q_P = 0$:
  - $0 + Q_T \cdot P_T = N$
  - $Q_T = N / P_T$
- Suppose $Q_T = 0$:
  - $Q_P \cdot P_P + 0 = N$
  - $Q_P = N / P_P$

Budget line



Budget line slope



- The slope of any line is: "rise over run".
  - Take one step to the right
    - "run" = 1
  - How much do you have to give up?
    - "rise" = -2
- The slope of this budget line is:
  - -2 / 1 = -2

Budget line slope

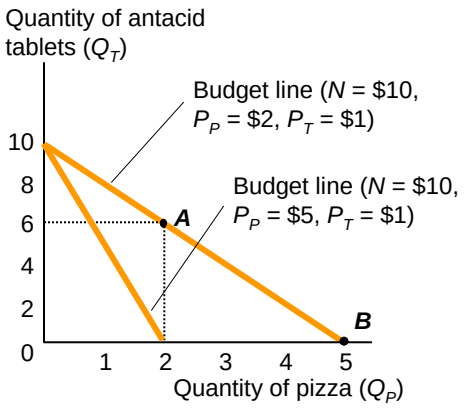
- The slope of the budget line is: “rise over run”.
  - If you buy one more unit of the good on the horizontal axis (one step to the right) …
  - … how many units of the good on the vertical axis do you have to give (negative step up) …
  - … while remaining on your budget line?
- The (absolute value of the) slope is the opportunity cost of one more unit of the good on the horizontal axis in terms of the good on the vertical axis.
  - Sometimes, this is also called the *relative price* of the good on the horizontal axis in terms of the good on the vertical axis.

Budget line slope

- In this case, the opportunity cost of the good on the horizontal axis (P) in terms of the good on the vertical axis (T) is:
  - $|-2 / 1| = 2$
- More generally, the opportunity cost of the good on the horizontal axis (P) in terms of the good on the vertical axis (T) is:
  - $|- P_P / P_T|$
- To see this consider the budget line equation:
- $$Q_P \cdot P_P + Q_T \cdot P_T = N$$
- *Rearranging:* $$Q_T \cdot P_T = N - Q_P \cdot P_P$$
  $$Q_T = N/P_T - Q_P \cdot (P_P/ P_T)$$

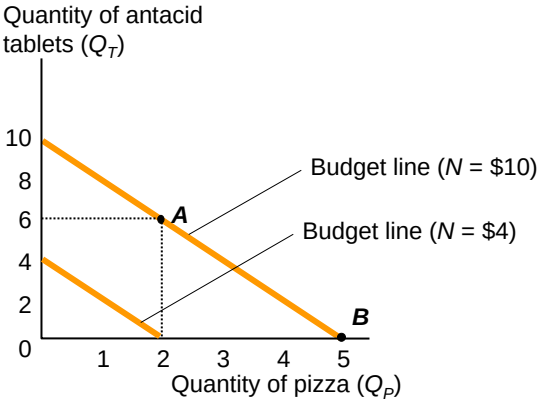
Budget line and price changes

- As the price of the good on the horizontal axis increases, its relative price (the slope of the budget constraint) increases.



Budget line and income changes

- As a consumer's income decreases, the budget line shifts inward.
  - The slope doesn't change because the relative price doesn't change.



As you like it

Utility and indifference curves

Utility

- The satisfaction or reward a good or bundle of goods gives you
- Utility is *"relative"*
  - The amount of satisfaction relative to alternatives
  - e.g. utility derived from a sandwich relative to a slice of pizza
- Utility is *"ordinal"* as opposed to cardinal
  - Utility from pizza greater than a sandwich implies that you prefer pizza to a sandwich, but doesn't say by how much
  - Example of "Cardinal" measure - weigh scale
- Utility is *"individual"*
  - Can not compare across individuals

Total Utility v.s. Marginal Utility

"Total Utility":

- The total amount of satisfaction obtained from consumption
  - e.g. the total satisfaction you derive from 10 slices of pizza

"Marginal Utility":

- The additional satisfaction you gain by consuming one more unit of a good
  - e.g the additional satisfaction you get from eating a second slice of pizza (not necessarily the same as the first slice)

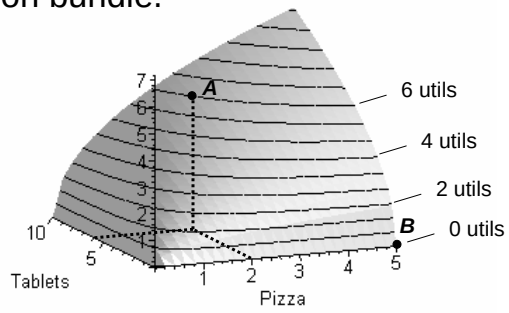
Law of Diminishing Marginal Utility

- The more of a good consumed (in any period) the less utility is generated by each additional (marginal) unit
  - e.g. the first v.s. fourth and fifth slices of pizza

# Slices	Total Utility		Marginal Utility	
0	0	↓	0	↓
1	12		12	
2	22		10	
3	28		6	
4	32	Increasing	4	Decreasing
5	32	or Constant	0	

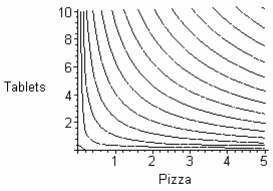
Utility function

- A consumer's *utility function* tells you the level of satisfaction, or *total utility*, that the consumer gets from each consumption bundle.
- The "height" of the utility function shows graphically the level of total utility for each consumption bundle.
  - Utility is measured in *utils*.



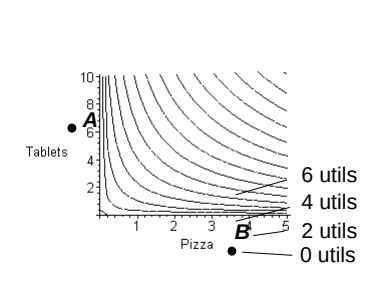
Utility and indifference curves

- An *indifference curve* connects all the consumption bundles that give the consumer the same level of total utility.



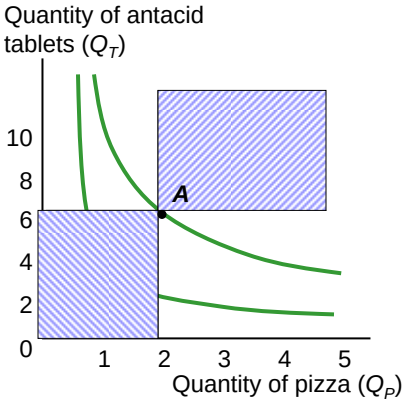
Indifference curves

- Which indifference curve a consumption bundle lies on shows graphically the level of total utility for that consumption bundle.



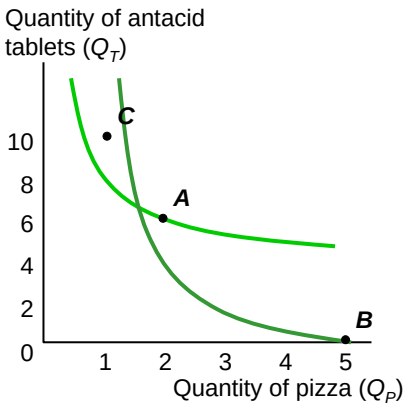
"Nice" indifference curves

- We'll assume that consumers' preferences are *monotone*.
  - "More is better": if one consumption bundle has more of all goods in it than another, then it must give the consumer higher utility.
- This means indifference curves "further out" represent bundles that are more preferred.
- It also means they slope down.



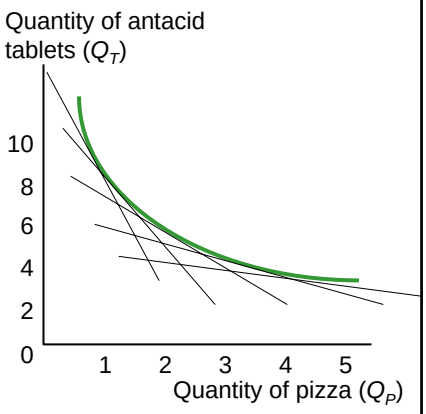
“Nice” indifference curves

- A rational consumer is one that has preferences that are *transitive*.
  - Transitivity means that if the consumer:
    - prefers consumption bundle A to consumption bundle B, and
    - prefers consumption bundle B to consumption bundle C, then
    - she also has to prefer consumption bundle A to consumption bundle C.
- This rules out “crossing” indifference curves.

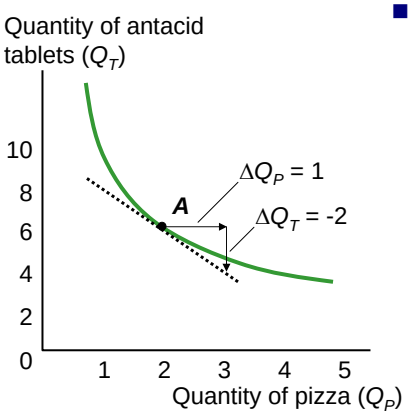


“Nice” indifference curves

- We’ll also assume that indifference curves have a convex shape.
  - As we increase the quantity of pizza (reduce quantity of antacid) the slope becomes flatter.
    - Decreases in absolute value
- To understand why we need to know something about what the slope represents



Marginal rate of substitution



- Suppose I give you one more unit of the good on the horizontal axis. How much of the good on the vertical axis would you <u>at most</u> be willing to give up?
  - This is (to a pretty good approximation) the (absolute value of the) slope of the indifference curve, and …
  - … the (absolute value of the) slope of the indifference curve at some consumption bundle is called the *MRS* at that consumption bundle.
    - Here, the MRS is 2.

Marginal rate of substitution

- As you get one more slice of pizza, and give up antacid tablets in place of it, your total utility remains the same.
  - How much does your total utility change from one more slice of pizza? This is just the *marginal utility* of pizza, MU_P.
    - From ΔQ_P more slices of pizza, your total utility changes by $\Delta Q_P \cdot MU_P$.
  - How much does your total utility change from one more antacid table? This is just the *marginal utility* of antacid tablets, MU_T.
    - From ΔQ_T more antacid tablets, your total utility changes by $\Delta Q_T \cdot MU_T$.

Marginal rate of substitution

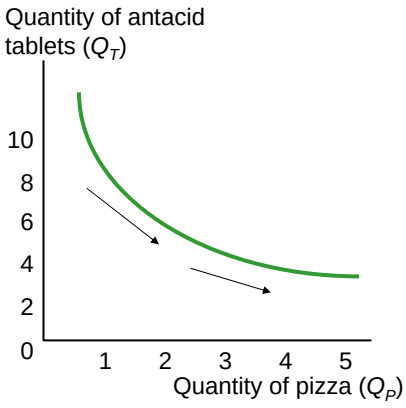
- As you get one more slice of pizza, and give up antacid tablets in place of it, your total utility remains the same.
  - In other words, the change in total utility from more pizza and the change in total utility from fewer antacid tablets adds up to zero.
  - $\Delta Q_P \cdot MU_P + \Delta Q_T \cdot MU_T = 0$
  - $\Delta Q_T \cdot MU_T = - \Delta Q_P \cdot MU_P$
  - $\Delta Q_T / \Delta Q_P = - MU_P / MU_T$
- So the MRS is MU_P / MU_T.

Why are indifference curves convex?

- Why does the slope become flatter?
- Slope = MRS = MU_P/MU_T
- Recall: law of diminishing marginal utility

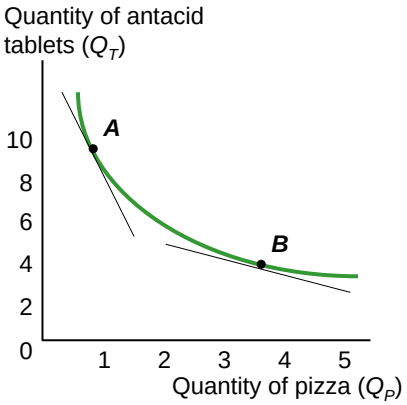
left to right: consume fewer tablets and more pizza

- Eat more pizza MU_P falls,
- Have fewer antacids MU_T rises
- MU_P/MU_T is falling or slope is falling **"diminishing MRS"**



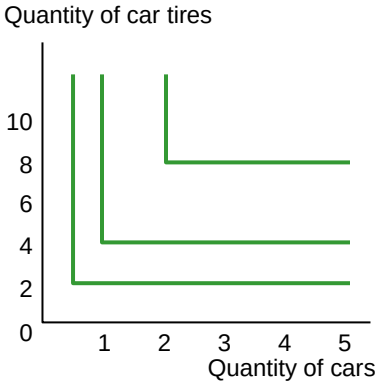
Why are indifference curves convex?

- At a point like A
  - You have lots of antacid
  - Willing to give up a lot of antacid to get pizza
  - slope is steep (MU_P big relative to MU_T)
- At a point like B
  - You have lots of pizza and little antacid
  - Not willing to give up a lot of antacid to get pizza
  - slope is flatter (MU_P small relative to MU_T)



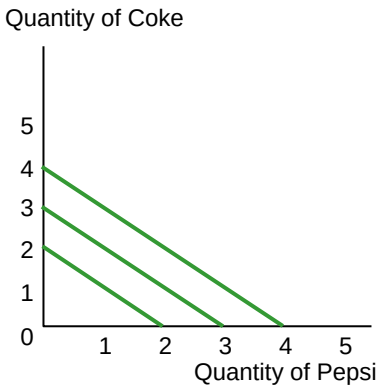
Special indifference curves

- Two goods that you always want to consume in the same ratio are called *perfect complements*.
  - One more unit of one good makes you no better off
  - Only get higher utility with more of both goods
  - Example: Cars and tires are perfect complements in the ratio 1 to 4 (for me).



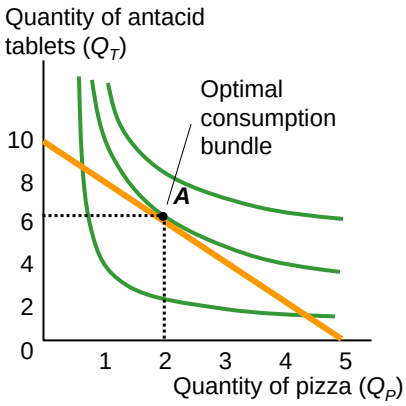
Special indifference curves

- Two goods for which the MRS is always the same are called *perfect substitutes*.
- Willing to trade off the two goods at a constant rate
  - Example: Coke™ and Pepsi™ are perfect substitutes in the ratio 1 to 1 (for me).



Optimal consumption bundle

- We now have all the information we need to solve for the optimal bundle
- Example:
  - Suppose a consumer has the following indifference curves representing her preferences:
  - And suppose that:
    - N = \$10
    - P_P = \$2
    - P_T = \$1



Tangency condition

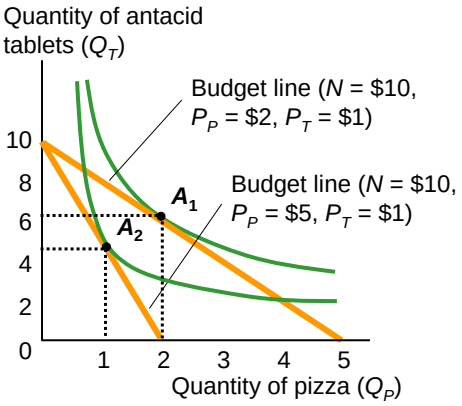
- Utility maximization occurs at a point of tangency between the budget constraint and indifference curve
- At the optimal consumption bundle,
  - Slope of budget constraint = slope of indifference curve
  - $P_P / P_T = MU_P / MU_T$
  - The rate at which the market allows the consumer to exchange antacid for pizza equals the rate at which the consumer is willing to exchange antacid for pizza

Tangency condition

- We can rewrite the tangency condition as follows
  - $P_P / P_T = MU_P / MU_T$ (multiply by MU_T and divide by P_P)
  - $MU_T / P_T = MU_P / P_P$
- The "law of the equal bang for the buck":
  - For the last dollar spent, you get the same additional utility from all goods.
- Why?
- Suppose instead that $MU_T / P_T > MU_P / P_P$
- The consumer could be made better off by spending a dollar more on antacid and a dollar less on pizza

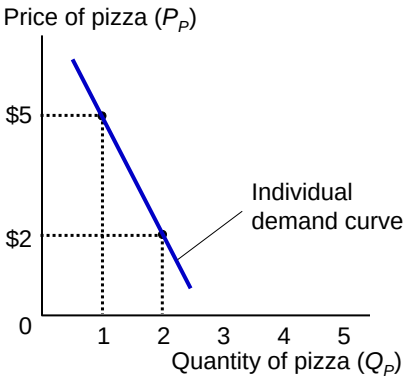
Changing prices

- As the price of the good on the horizontal axis increases, the optimal quantity of that good consumed changes.
  - (Of the other good too, but we don't care.)



Summary of consumer decisions

- As the price of a good changes, we keep track of how much of that good the individual consumer chooses to consume.
  - This is the *individual demand* curve.
- Next we'll see why we believe that quantity falls as price rises.

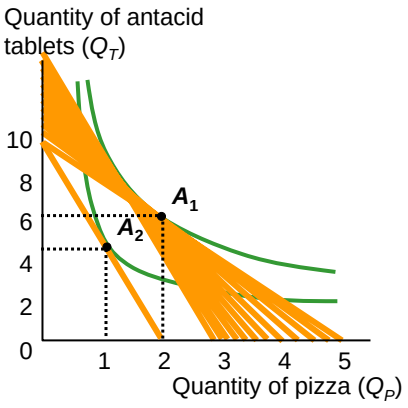


Understanding individual demand

Income and substitution effects

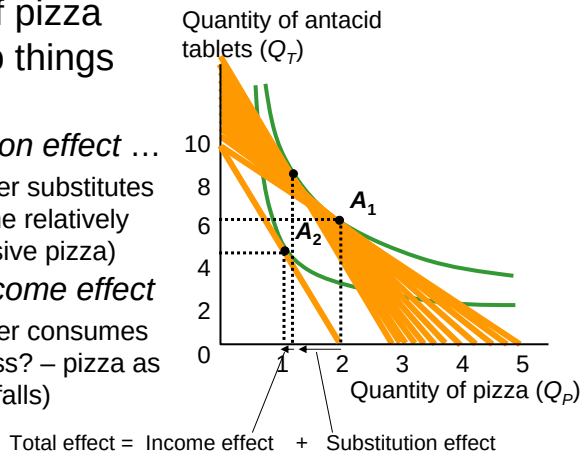
Income and substitution effects

- As the price of pizza increases, two things happen:
  - The relative price of pizza increases …
    - (the budget line becomes steeper, staying on the same indifference curve)
  - … and the consumer becomes "poorer"
    - (the budget line shifts in)



Income and substitution effects

- As the price of pizza increases, two things happen:
  - The *substitution effect* …
    - (the consumer substitutes away from the relatively more expensive pizza)
  - … and the *income effect*
    - (the consumer consumes – more or less? – pizza as real income falls)



Normal and inferior goods

- As income changes, will a consumer consume more or less of a good?
  - It depends.
- Goods for which consumption falls as income falls are *normal goods*.
  - The vast majority of goods are *normal goods.*
- Goods for which consumption rises as income falls are *inferior goods*.
  - Examples? Single-ply bathroom tissue, Spam™…

Do demand curves slope down?

- For a normal good, definitely yes:
  - As price rises …
    - … the substitution effect says to consume less
    - … the income effect says to consume less.
- For an inferior good, maybe:
  - As price rises …
    - … the substitution effect says to consume less
    - … the income effect says to consume more.
  - Now it depends on which effect is stronger.
    - If the substitution effect is stronger, everything is fine.
    - If the income effect is stronger, we have a problem (*Giffen good*).
- The “law of demand”: demand curves slope down (excludes Giffen goods).