The Theory of the Consumer

- Model of individual choice:
  - "Consumers choose the best bundle of goods and services that they can afford."
- 1) *"afford":* depends upon opportunities / budget constraints
- 2) *"best":* depends upon preferences
- 3) *"choose":* assumes optimizing (goal oriented) behavior

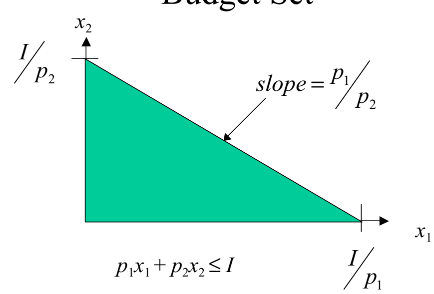
Budget Constraints

- A consumer must choose among bundles of goods: $(x_1, x_2, \ldots x_n)$ example: (fish, beef, milk, CDs, books).
- Each good has a price: $(p_1, p_2 \ldots p_n)$.
- The consumer has income I to spend on goods.

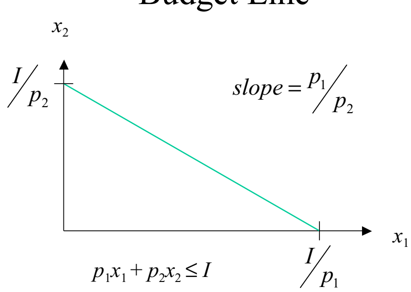
Two Good Case

- Consider the case of 2 goods (x_1, x_2) (e.g.., video games, baby food). Let's say the price of these goods are p_1, p_2.
- A bundle (x_1, x_2) is affordable (in the budget set) if and only if $p_1x_1 + p_2x_2 \leq I$.
- The set of affordable bundles is the budget set.

Budget Set



Budget Line

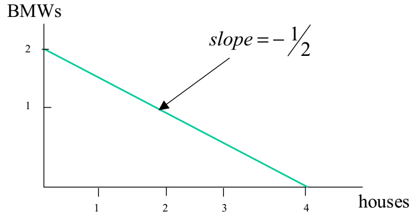


Budget Line 'Facts'

- The budget line intersects the x_1 axis at I/p_1
- The budget line intersects the x_2 axis at I/p_2
- The slope of the budget line is $-p_1/p_2$
  - How do you show this?
    - $p_1x_1 + p_2x_2 = I$
    - $x_2 = I/p_2 - (p_1/p_2)\, x_1$
- The consumer can buy only positive amounts of goods, so $x_1 \geq 0$ and $x_2 \geq 0$

Example: Determining the Budget Line

- x_1 = houses (not in L.A.!)
- x_2 = BMWs
- p_1 = \$35,000
- p_2 = \$70,000
- I = \$140,000



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What Does the Budget Line Tell Us?

- The 'opportunity cost' of consuming an additional unit of good 1 in terms of lost consumption of good 2.
  - Q; In this example, what is the opportunity cost of a BMW?
  - A: Two houses.
  - Why? The answer is determined by the shape of the budget line. The slope of the budget line is equal to the price of good 1 in terms of good 2. This slope tells us how much good 1 we must give up to get an additional unit of good 2.

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Budget Constraints with More than Two Goods

- We can expand the bundle of goods to three or more goods
  - Budget line: $p_1x_1+p_2x_2+p_3x_3 = I$
  - N goods: $\sum_{i=1}^{N} p_i x_i = I$
- Often, we define good 2 as *a composite good* (i.e., all other goods)
  - e.g.: x_1= grad school, x_2= all other goods

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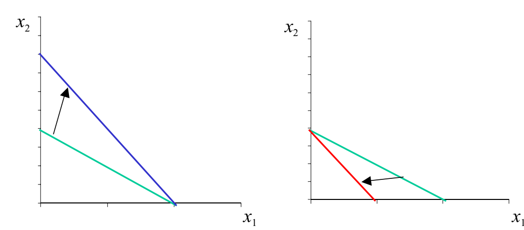
The Effect of a Price Change on the Budget Line



Price of x_2 falls Price of x_1 rises

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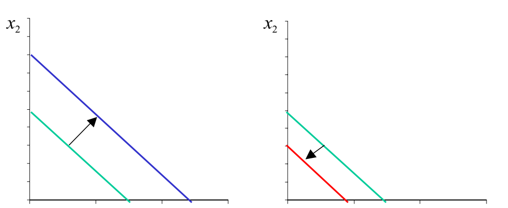
The Effect of a Change in Income on the Budget Line



Income Rises Income Falls

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What Happens if the Prices of Both Goods Double?

- The effect is the same as if income were cut in half.

$$x_1(2p_1)+x_2(2p_2)=I$$

$$x_1p_1+x_2p_2=\frac{I}{2}$$

- What would happen if both prices and income double?

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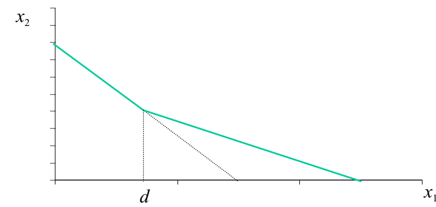
Budget 'Lines' Can Be Nonlinear

- Up to now, we have only considered budget lines when there are fixed and non-variable prices.
- In some applications, such an assumption may not apply.
- Examples:
  - Progressive income taxes
  - Volume discounts
  - Food stamps (and other welfare programs)

Volume Discounts

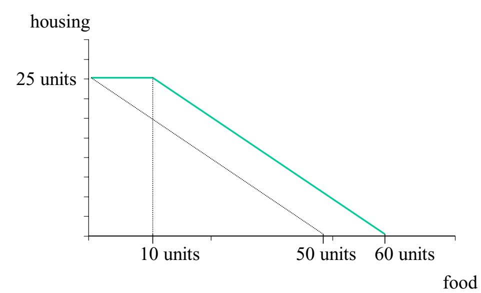
- The first d units of x_1 cost p_1
- Any units after d cost $p_1/2$



Food Stamps

- 2 goods, food and housing, with prices $1 and $2 respectively.
- Income is equal to $50
- The consumer has a coupon (which can't be sold) worth $10 of food
  - draw budget constraint
  - how much does it cost to trade food for housing (with and without the coupon)

Food Stamps Budget Constraint



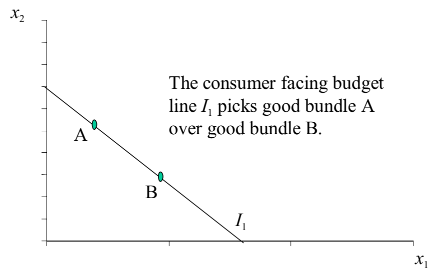
Revealed Preference

- A careful analysis of budget constraints can lead to powerful predictions about consumer behavior.
- A good example of this is revealed preference analysis.
- Using just budget constraints and observed choices, we can prove that demand curves slope downward.

Axiom of Revealed Preference

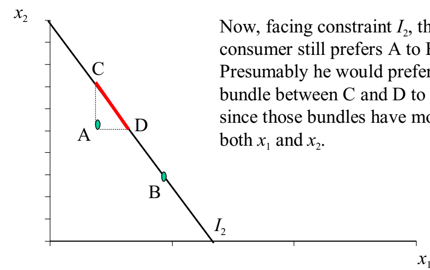
- Intuitive explanation of the axiom of revealed preference:
  - Given price and income, if two bundles of goods (say A and B) are available to a consumer and he chooses A, then A will never be chosen over B no matter what prices and income.
  - If the consumer chooses B, then A must not be affordable, given prices and income.

Graphical Demonstration of Revealed Preference



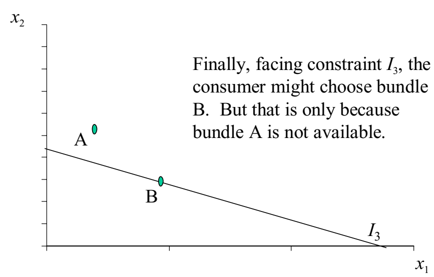
The consumer facing budget line I_1 picks good bundle A over good bundle B.

Graphical Demonstration (II)



Now, facing constraint I_2, the consumer still prefers A to B. Presumably he would prefer any bundle between C and D to A, since those bundles have more of both x_1 and x_2.

Graphical Demonstration (III)



Finally, facing constraint I_3, the consumer might choose bundle B. But that is only because bundle A is not available.

Downward Sloping Demand

- Suppose we observe that a consumer is indifferent between two bundles of goods, C and D. The goods are X and Y.
- Suppose that C is chosen when prices are: $\left(p_X^C, p_Y^C\right)$
- Suppose that D is chosen when prices are: $\left(p_X^D, p_Y^D\right)$

Downward Sloping Demand (II)

- Since the consumer is indifferent between C and D, when C is chosen, D must cost at least as much (and perhaps more) than C:

$$p_X^C X_C + p_Y^C Y_C \le p_X^C X_D + p_Y^C Y_D$$

- Similarly, when D is chosen, C must cost at least as much (and perhaps more) than D:

$$p_X^D X_D + p_Y^D Y_D \le p_X^D X_C + p_Y^D Y_C$$

Downward Sloping Demand (III)

- Adding these two equations together and combining terms yields:

$$\left(p_X^C - p_X^D\right)\left(X_C - X_D\right) + \left(p_Y^C - p_Y^D\right)\left(Y_C - Y_D\right) \le 0$$

- If the price of Y is fixed then:

$$\left(p_X^C - p_X^D\right)\left(X_C - X_D\right) \le 0$$

- This means that, holding all else except p_X fixed, price and quantity move in opposite directions—downward sloping demand.