Consumer Theory

- How do consumers make choices?
- How do consumers react to changes in the world around them?

Rational Choice Model

- Decisions by consumers are based on 2 things:
  - Preferences
    What do people want?
  - ✓ Budgets
    what people can afford

What is a model?

- A collection of assumptions
- assumptions are combined to make predictions about the "real world"
- Predictions are only as good as our assumptions
  - If our assumptions are bad, our predictions will (probably) be bad too!

Problem

All assumptions are false!

- The accuracy of our model depends on the accuracy of assumptions
- There is no "scientific" way to test assumptions

Budget constraints

Example

2 goods: Tacos & Beer

b: # of beers you drink

t: # of tacos

P_b: price of beer

P_t: price of tacos

Total expenditure:

$P_b b + P_t \cdot t = \text{expenditure}$

$P_b = \$4$

$P_t = \$2$

you have \$40 in your pocket

$4b + 2t \leq 40$

total expenditures must be less than your budget

Suppose you have 5 tacos. How much beer can you buy?

$40 - 2 \cdot 5 = \$30$ left over

$\frac{30}{4} = 7.5$ beers

$\rightarrow b = \frac{40 - 2t}{4}$

In general:

- 2 goods: 1 and 2
- Quantity of good 1 consumed is x_1
- Quantity of good 2: x_2
- Prices: P_1 and P_2
- income: m

All variable measured per unit of time

ie dollars per hour in wages

beers per night

Define: (x_1, x_2) is a consumption bundle

- the amount of stuff we are consuming

We say a consumption bundle is affordable if:

$$\underbrace{p_1 x_1 + p_2 x_2 \le m}_{\text{budget constraint}}$$

Example

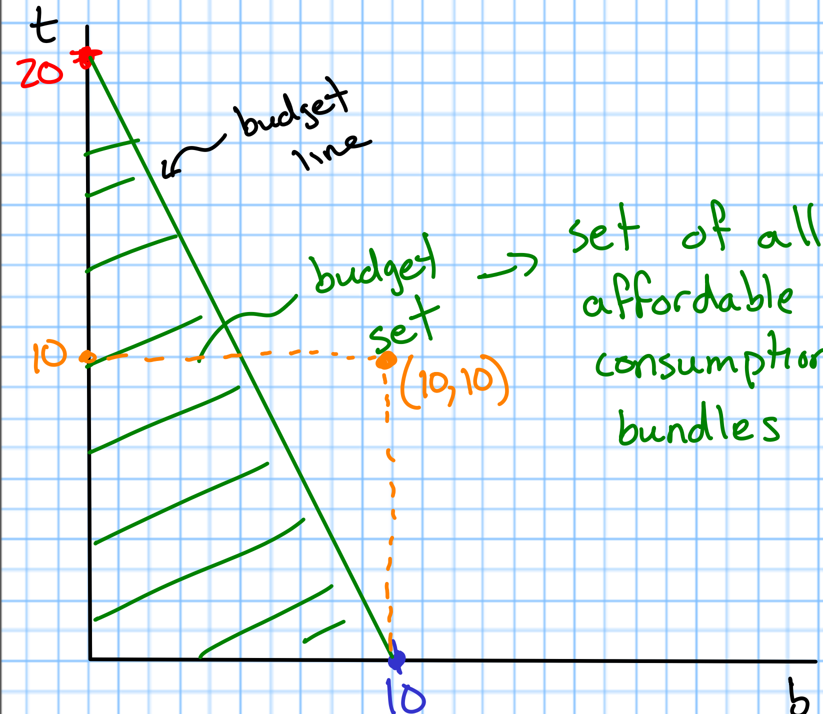
$P_b = 4, \quad P_t = 2, \quad m = 40$

- Suppose we spend all of our income on b. How much can we consume?

$t = 0, \quad b = \frac{m}{P_b} = \frac{40}{4} = 10$

- Suppose we spend everything on t:

$b = 0, \quad t = \frac{m}{P_t} = \frac{40}{2} = 20$



Is (10,10) affordable?

$10 \cdot 2 + 10 \cdot 4 = 20 + 40$

$= 60 > 40$

Budget line

$$p_1 x_1 + p_2 x_2 = m$$

Any bundle on the budget line uses all of our income

expenditures = income

Let's express x_2 as a function of x_1

$$x_2 = x_2(x_1)$$

Solve for x_2:

$$p_1 x_1 + p_2 x_2 = m$$

$$p_2 x_2 = m - p_1 x_1$$

$$x_2 = \frac{m}{p_2} - \frac{p_1}{p_2} x_1$$

$$x_2(x_1) = \frac{m}{p_2} - \frac{p_1}{p_2} x_1$$

Given x_1, how much x_2 can we buy?

- Let's suppose we are consuming (x_1, x_2) and we decide to increase our consumption of x_1 by 1 unit.

How much x_2 do we need to give up?

$\rightarrow -p_1/p_2$

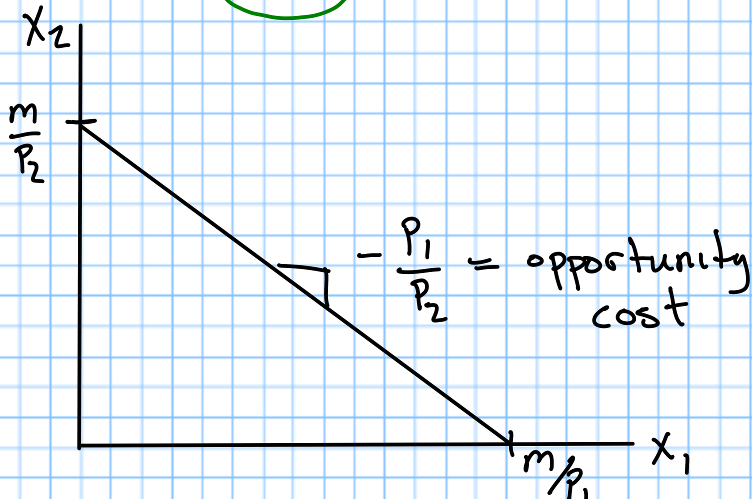
$-\frac{p_1}{p_2}$ is the opportunity cost of x_1 in terms of X_2

$$X_2(X_1) = \frac{m}{P_2} - \frac{P_1}{P_2} X_1$$

• What is the slope of this function?

$$y = mx + b$$

$\rightarrow -\frac{P_1}{P_2}$

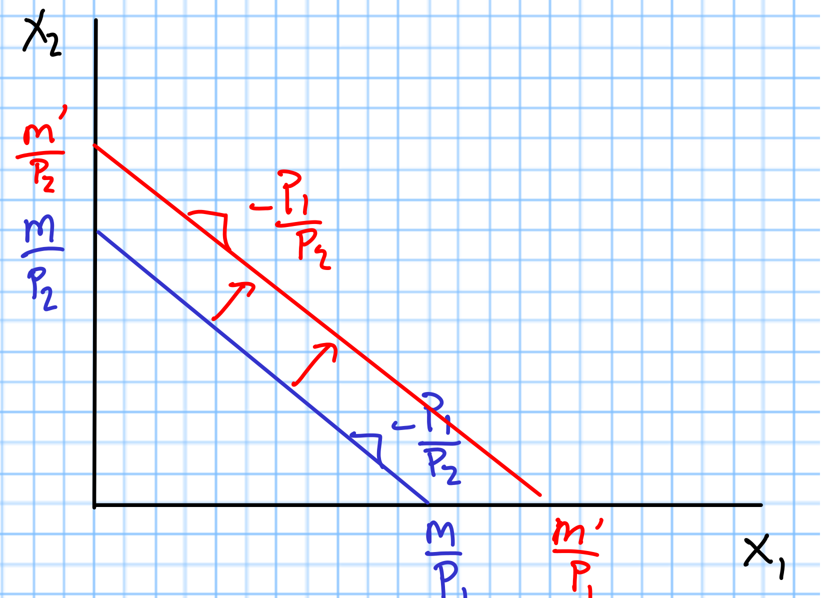


Income changes

$$P_1 X_1 + P_2 X_2 = m$$

Suppose m increases to $m' > m$

m' is a number, different than m

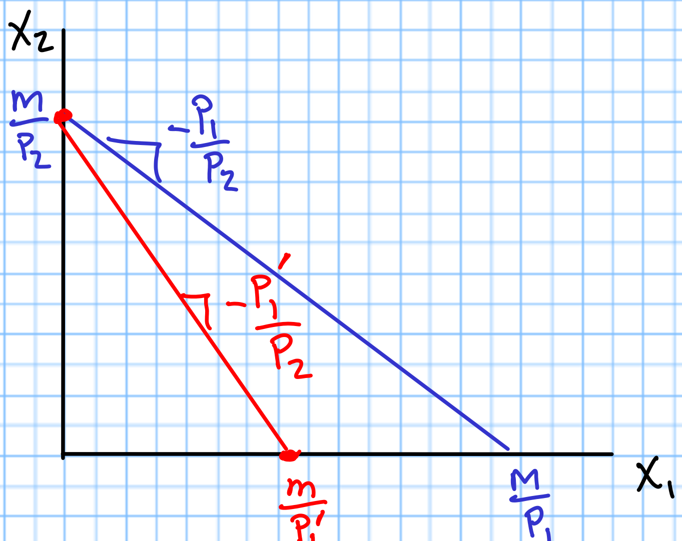


- Changes in income don't affect opportunity costs
- slope remains the same, budget line shifts

Price changes

$$p_1 x_1 + p_2 x_2 = m$$

Suppose p_1 increases to p_1'



- Opportunity costs change
- The budget set gets smaller

Example

Suppose p_1 and p_2 increase by a factor of t

$$p_1' = t p_1$$

$$p_2' = t p_2 \quad , \quad t > 1$$

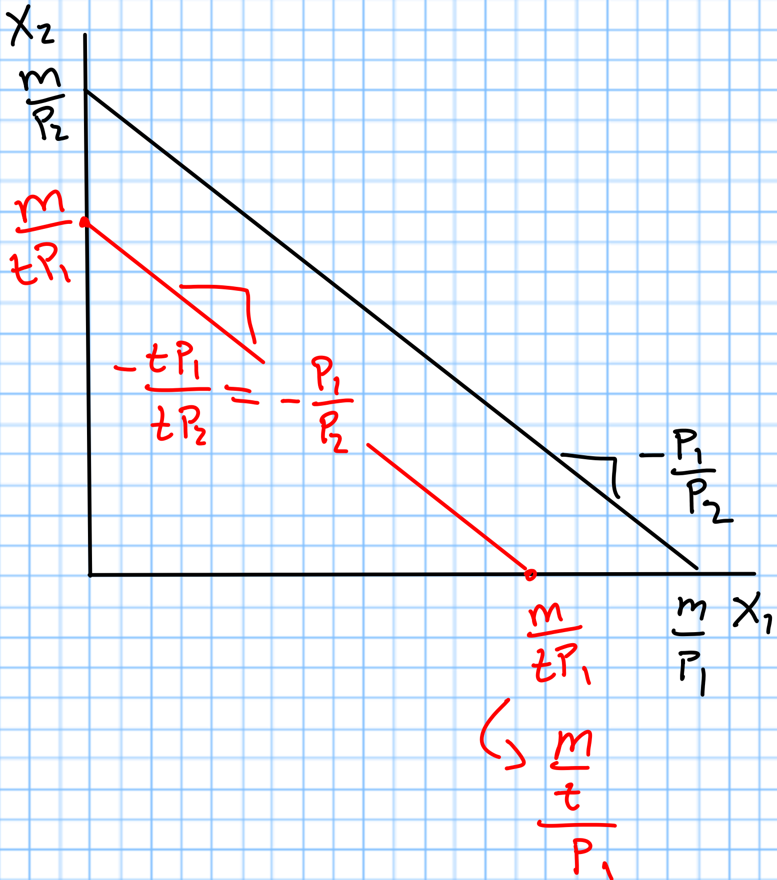
$$p_1 x_1 + p_2 x_2 = m$$

$$t p_1 x_1 + t p_2 x_2 = m$$

$$t(p_1 x_1 + p_2 x_2) = m$$

$$p_1 x_1 + p_2 x_2 = \frac{m}{t}$$

$$\frac{m}{t} < m$$



Suppose P_1, P_2, m increase by t (inflation)

$$P_1 x_1 + P_2 x_2 = m$$

$$tP_1 x_1 + tP_2 x_2 = tm$$

$$\cancel{t}(P_1 x_1 + P_2 x_2) = \cancel{t} m$$

$$P_1 x_1 + P_2 x_2 = m$$

Nothing changes!

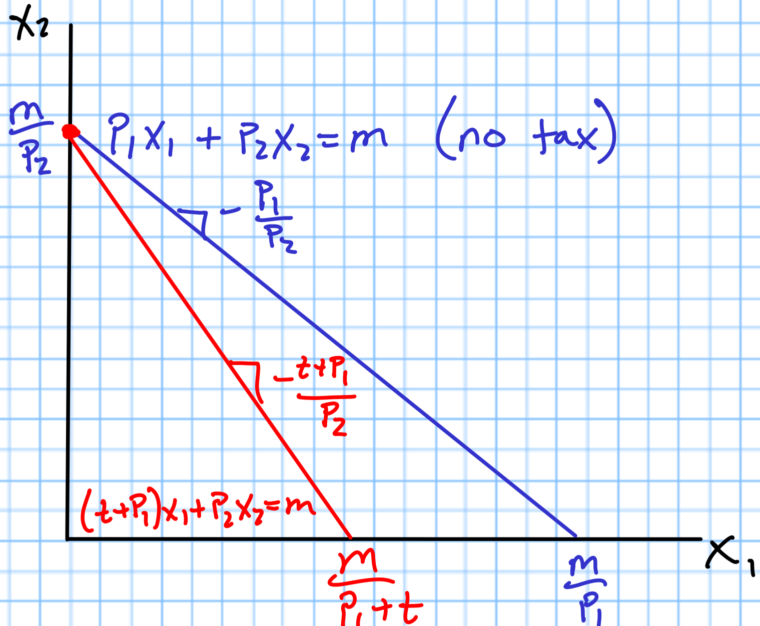
Taxes

- Quantity taxes
  - flat amount paid per unit of a good consumed

  Examples: Gas tax (15¢/gallon)
  "Vice" taxes
  Bottle deposit

- Say good 1 has a quantity tax of t per unit
- Expenditures on good 1: $(t+p_1)x_1$
- Budget line:

$$(t+p_1)x_1 + p_2x_2 = m$$



Ad Valorem taxes

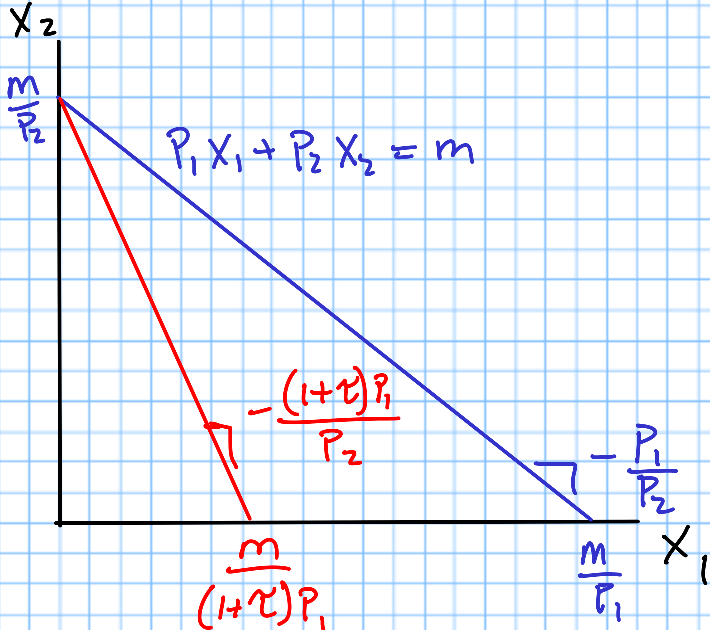
- Percentage of the price
- Sales tax, VAT,
- suppose price of good 1 is p_1, and there's a ad valorem tax of τ.

Budget line:

$$(1+\tau)p_1x_1 + p_2x_2 = m$$

Example: sales tax of 2% on good 1. If I buy x_1 units of good 1, I spend: $(1.02)p_1x_1$

2% more than what I would spend if no tax



Suppose we impose a quantity tax of t on both goods

$$(t+P_1)x_1 + (t+P_2)x_2 = m$$

- What happens to the opportunity cost as a result of the quantity tax?

before tax: $-\frac{P_1}{P_2}$

after tax: $-\frac{t+P_1}{t+P_2}$

What has happened? Has the opportunty cost changed?

Example: $P_1 = 4$, $P_2 = 2$, $t = 1$

Before tax: $-\frac{P_1}{P_2} = -\frac{4}{2} = -2$

After tax: $-\frac{t+P_1}{t+P_2} = -\frac{4+1}{2+1} = -\frac{5}{3}$

$\longrightarrow$ opportunity cost has changed because of tax

Now suppose we impose an ad valorem tax of τ on both goods

Before tax: $-\frac{P_1}{P_2}$

After tax: ?

Budget line:

$(1+\tau)P_1 X_1 + (1+\tau)P_2 X_2 = m$

Slope (op. cost): $-\frac{\cancel{(1+\tau)} P_1}{\cancel{(1+\tau)} P_2}$

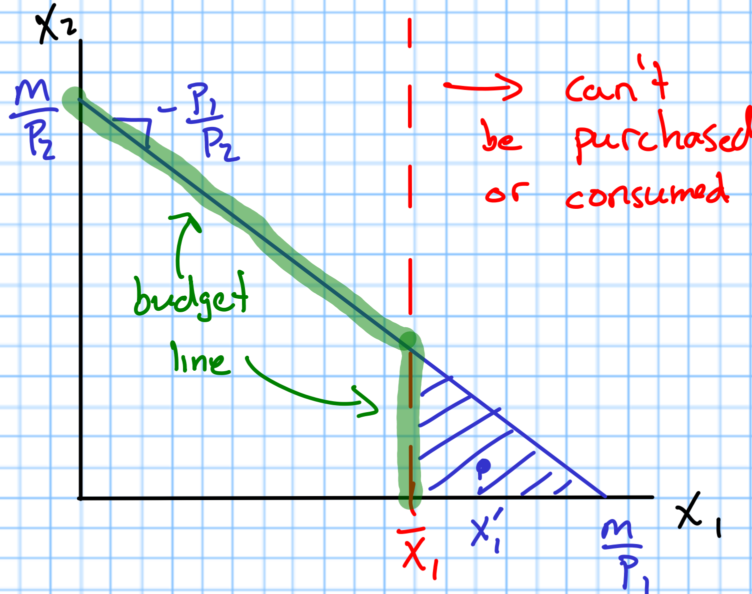
$= -\frac{P_1}{P_2}$

→ Ad valorem taxes do not change opportunity costs!

Rationing

- Some "external" constraint imposes limits of quantities of goods available for purchase
- Examples: shortages after a natural disaster (water, canned foods)
  - Government rationing

Suppose good 1 is rationed
- can't consume more than $\bar{X}_1$



$x_1' > \bar{x}_1$

Composite goods

So far we've only considered 2 goods

- Real world has many more than 2 goods

Options:

1. ~~We can think of budget lines occuring in n-dimenhonal space~~
2. Consider 1 good at a time against a composite good

$$p_1 x_1 + c = m$$

c: composite good

x_1: the amound of good 1 we consume

→ c is everything else

→ income left over after we consume x_1

Suppose I consume x_1

Then I have $m - p_1 x_1$ left over

$c = m - p_1 x_1$