Lecture 3: Elasticity

September 15, 2020

Overview

Course Administration

1. Reading quiz

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   - Last year's midterm is now posted for review (new "exams" sub-section on "lectures" tab)
   - Next week I'll post instructions on how to post a pdf so you can practice
   - Midterm review with TA Dan October 10, 10 am to noon in his zoom room (see Piazza)

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4. Any questions or outstanding issues?

How What You're Learning is Policy-Relevant

Ripped from Headlines presentation(s)

As a reminder, next week

Afternoon

Finder	Presenter
Alie Mihuta	Merritt Tollison
Dina Pinsky	Chris Daly

Evening

Finder	Presenter
Trey Johnston	Ellaina Williams
Sarah Fritz	Laura Brennan
Alek Libbin	Emma Herman

Arlington and Uber

Wash Po on Arlington and Uber, or pdf version here

- From the article, what policy is Arlington considering?

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- Is this policy a change to supply or demand?

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- From the article, what policy is Arlington considering?
- Is this policy a change to supply or demand?
- Given this change in supply, what is the relevant elasticity for the county to consider to understand how much the equilibrium quantity will change?

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- Does the price the transit consumer faces change?
  - From an individual's perspective, what goes into the "price" of riding the bus, in addition to the price of the bus?
  - How do you think this policy changes the total price of using transit?
- Do you think it's a good idea to linearly extrapolate from the original demand curve to predict the demand for the uber-like product?
- Do you think the price elasticity of transit w/r/t price is higher or lower than that of driving w/r/t gas price?

Read more about this issue here.

In-Class Problems

Next Class

- GLS, Chapter 4
- Use Numbers 1 of 3 due Lecture 5

Online Section: Lecture 3

Demand Curves Are Not Linear

Demand Curves are Not Linear

1. What do we mean by linear?
2. Implications of linear curve
3. Building a non-linear curve
4. Example of why the shape matters

What Do We Mean By Linear?

- A linear function can be written as $y = mx + b$
- If b is zero ($y = mx$), then a 5-unit change in $x \rightarrow 5*m$-unit change in y
- If b is not zero, this isn't exactly true. However, the slope is always the same everywhere

Implications of a Linear Demand Curve

- There is a price sufficiently high that no one wants to consume the good
- At a price of zero, there is a finite quantity demanded
- Implies that many small changes in price always have the same impact as an equivalent large change in price

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- At a price of zero, there is a finite quantity demanded
- Implies that many small changes in price always have the same impact as an equivalent large change in price $\rightarrow$ this may be quite wrong

Where a Demand Curve Comes From

Thanks to Hal Varian's textbook

Let's assume we're interested in the market for apartments in a medium-sized college town. Further assume that

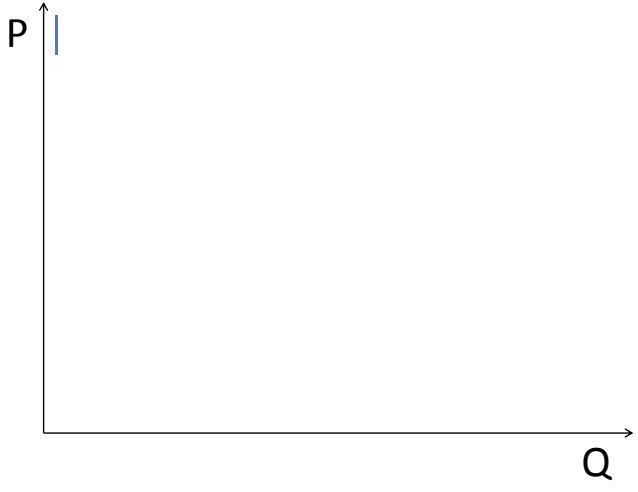
- there are two types of apartments: near and far from university
- near apartments are better
- if you don't get an apartment near, you can get one far at a known fixed price
- all apartments are identical
- each person wants only one apartment

We are interested in the price of the near apartments.

Putting Together a Demand Curve

- Reservation price is the "maximum willingness to pay for something"
- What is the highest reservation price of anyone in this market? $\rightarrow$ this is the top of the demand curve
- As we lower the price one dollar, how many additional people want an apartment? This is Q
- Another dollar? This is the next (Q, P) on the curve

Putting Together a Demand Curve: In Pictures



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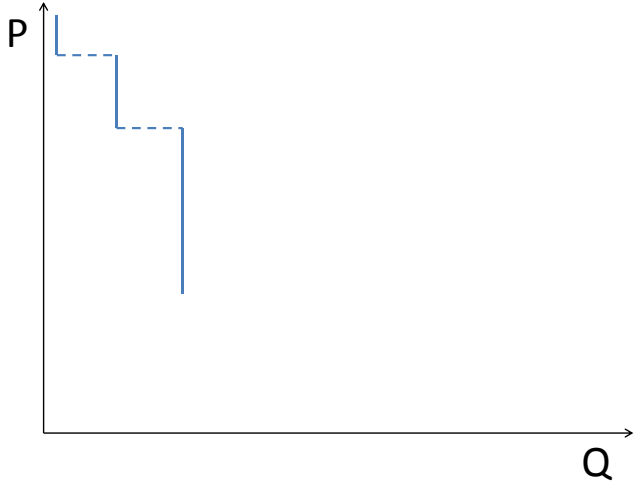

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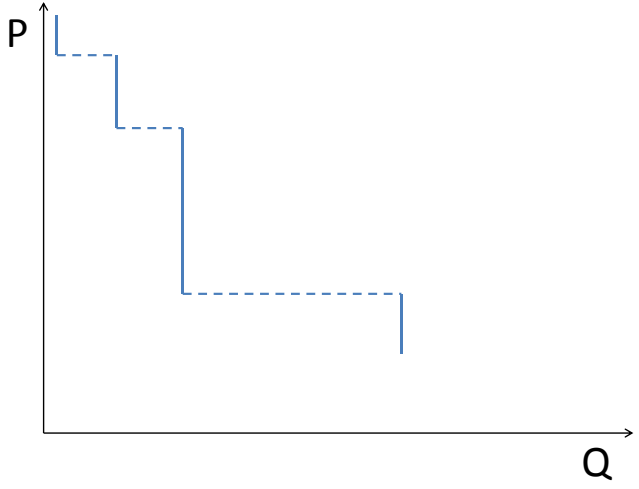

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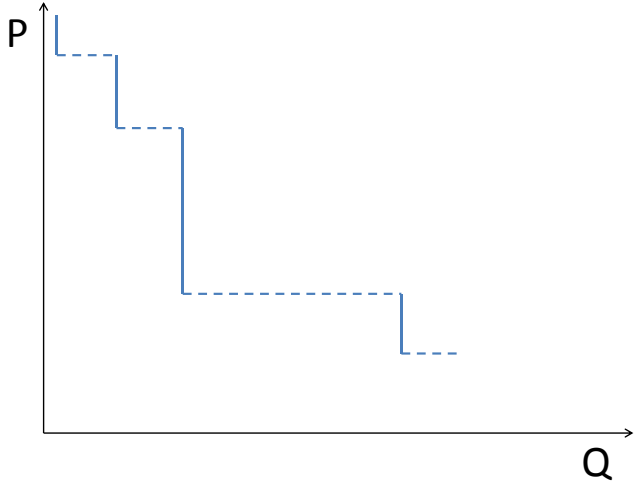

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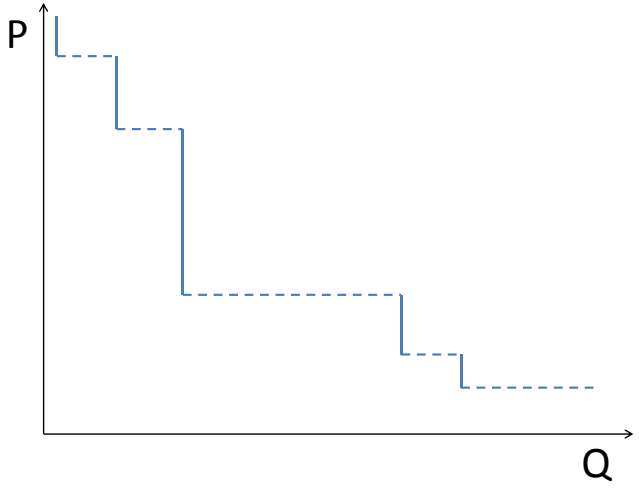
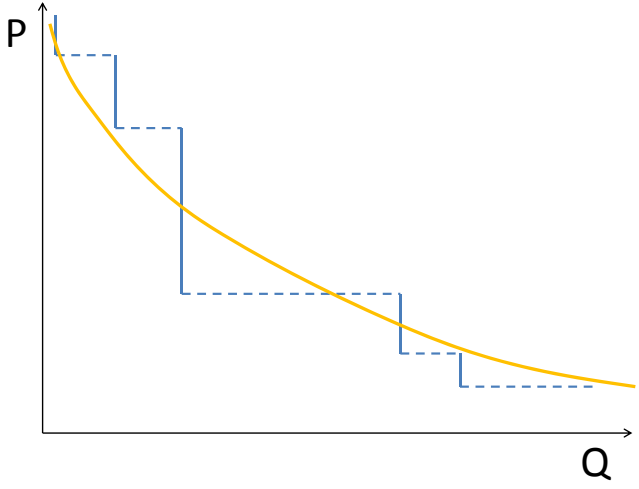


With Many Steps, Imagine a Curve



Why the Shape of the Curve Matters: Avocados!

- 1914 US puts limits on imports of Mexican avocados
- 1994 North American Free Trade Agreement (NAFTA) passes
- 2004 USDA agrees to year-round avocado imports from Mexico
- Domestic producers of avocados
  - form expectations from part of demand curve they observe
  - except that increase in Q will lead to decline in P
- What happens?

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- What happens? Almost no change in P, big increase in Q

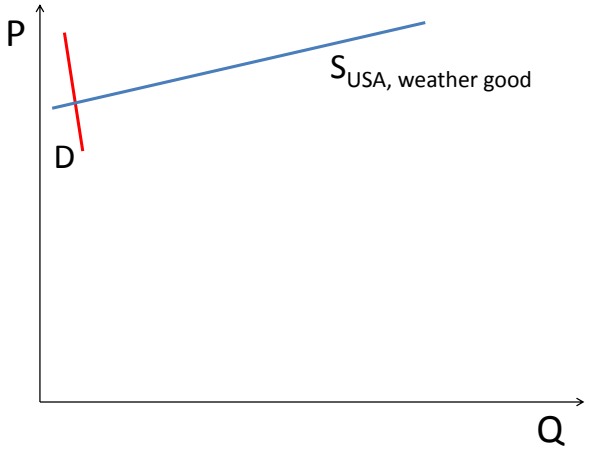
Three (Not Mutually Exclusive) Explanations

Or, Is Everything We've Learned Wrong?

1. Demand curve is not linear
2. Demand increases
3. "Price" for big customers includes reliability of supply, so true "price" fell $\rightarrow Q \uparrow$

E.1.: Demand Curve is Not Linear

The World Before NAFTA



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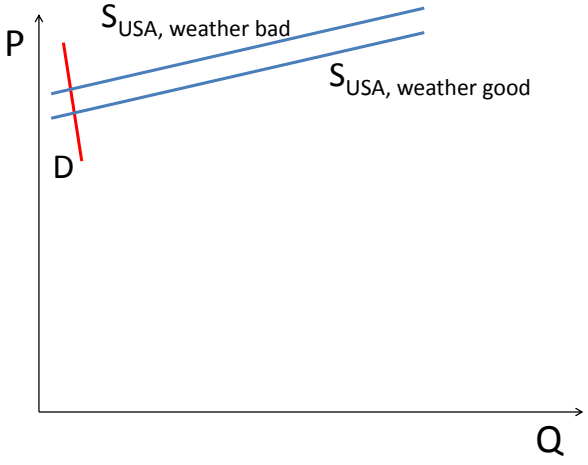
Where Is World Supply?



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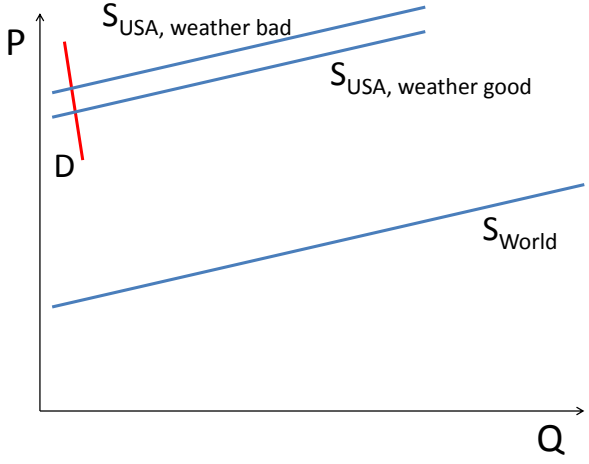
If You Think Demand is Linear, What Happens?



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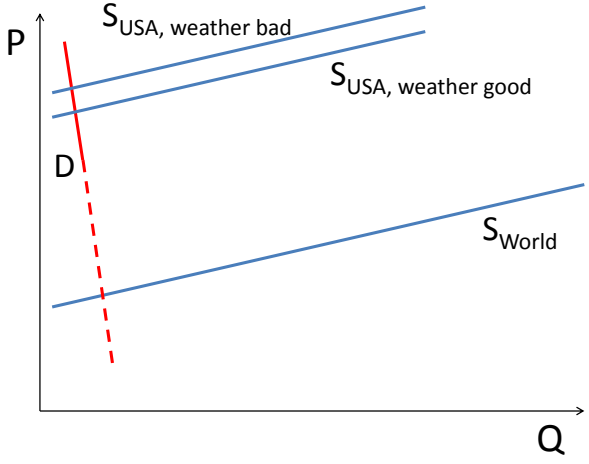
Why Is This Unlikely to Have Been the Case?



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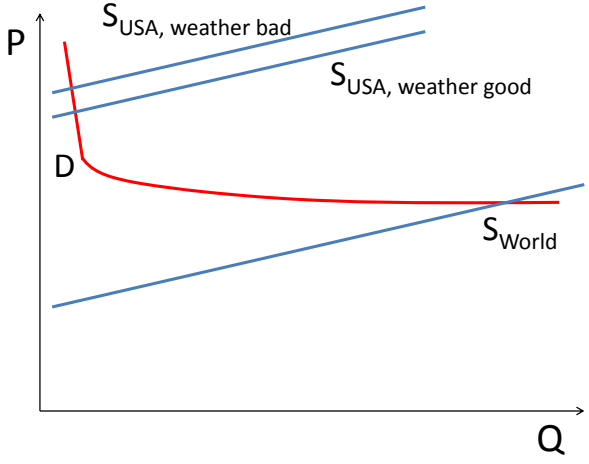
Curved Demand Is One Explanation



E.3.: "Price" for big customers falls

- Elsewhere, I learned that after the introduction of Mexican avocados, big chains considered putting them in menus
- Major cost component for big chain input is reliability
  - Mexican supply guarantees year-round supply
  - And more reliable supply
- Thus, for big firms, maybe this is now a different market
  - Not a niche product
  - More of a commodity
  - Think of Chipotle as the consumer here
  - What happens to Chipotle consumer surplus with addition of this market?

Defining Elasticity

Elasticity

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- Absolutely crucial for policy decisions
- Formally, percentage change in one value relative to percentage change in another

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- Formally, percentage change in one value relative to percentage change in another
- In math, elasticity is

$$E = \frac{\%\Delta Q}{\%\Delta P}$$

- Δ is capital Greek letter delta, denoting change

Price Elasticity of Demand

- How responsive are consumers to a change in price?

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  - $|x|$ is the absolute value of x, so x if $x > 0$, and $-1 * x$ if $x < 0$

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  - $|x|$ is the absolute value of x, so x if $x > 0$, and $-1 * x$ if $x < 0$
- The larger the number of substitutes, the more consumers can choose a different product when price increase $\rightarrow$ the larger $|E_D|$

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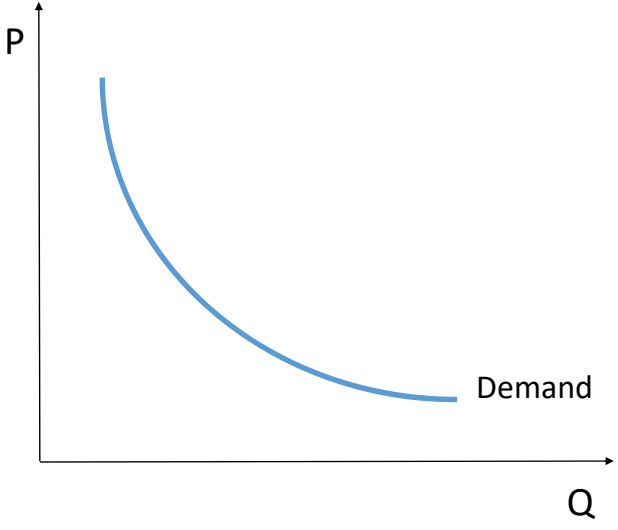
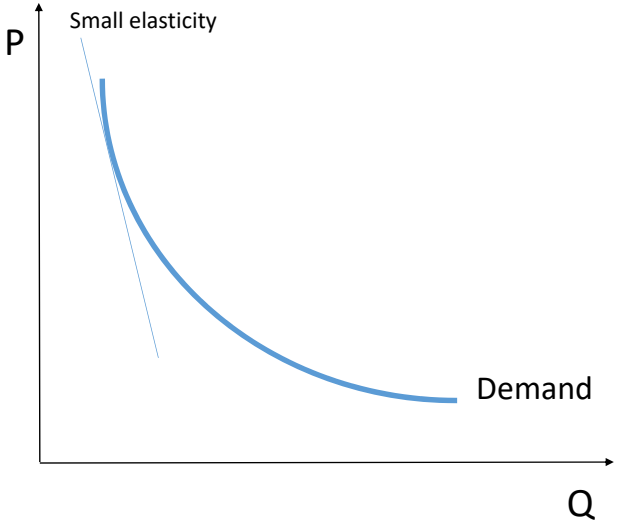
- The more easily the producer can decrease production, the larger $|E_S|$

Elasticity with Non-Linear Demand Curves



A non-linear demand curve

For Non-Linear Demand Curves, Elasticity is the Slope



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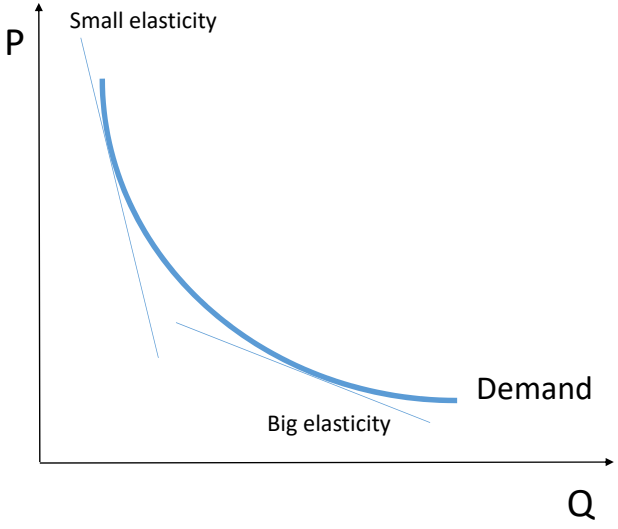
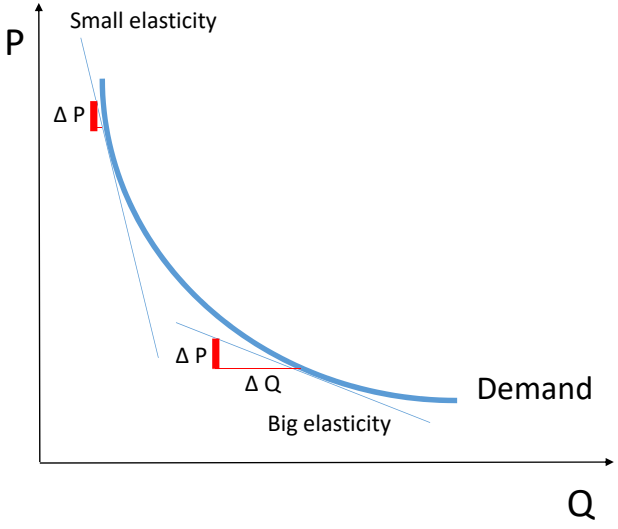


When prices are low, demand is more elastic, or larger in absolute value

For Non-Linear Demand Curves, Elasticity is the Slope



The more vertical line gives a smaller change in quantity for the same change in price

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Drawing Perfectly Inelastic and Perfectly Elastic Demand and Supply

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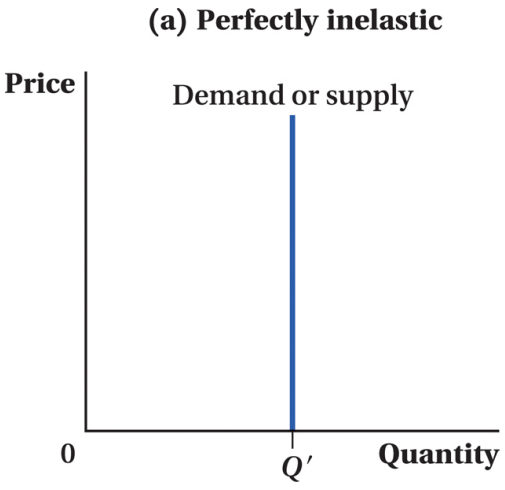

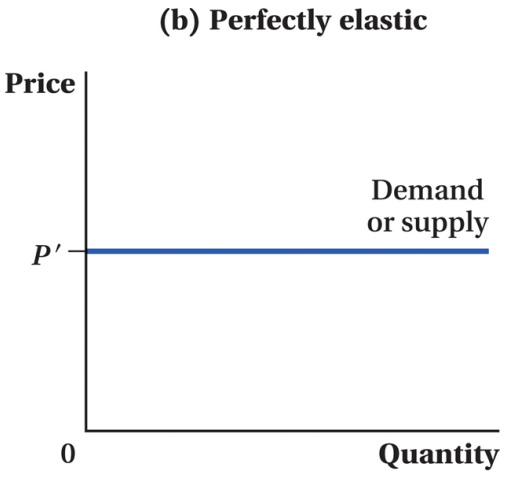

Time Horizon Matters for Elasticity

- Over short time horizons, the behavior of people and firms can be pretty inelastic
- In the long run, everything is elastic

Elasticity and Policy

Elasticity and Policy

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- policy makers can change the "price" that workers receive by changing tax rates
- if you want to know how much revenue taxes yield, you need to know how responsive workers are to changes in wages
- Or, if you want to know how many people will take up Obamacare, you need to know how responsive the uninsured are to changes in the price of insurance

Many Types of Elasticity

Many Types of Elasticities

- Price elasticity of demand and supply
- Income elasticity of demand
- Cross-price elasticity of demand

Income Elasticity of Demand

- We are interested in the income elasticity of demand

$$E_I^D = \frac{\%\Delta Q^D}{\%\Delta I}$$

- What do you consume more of as your income increases?

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- What does mean if $E_I^D > 1$

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- What do you consume less of as your income increases? These are inferior goods, and $E < 0$.
- What does mean if $E_I^D > 1$ Your consumption increases more than your income $\rightarrow$ luxury good

Contemplate Yourself!

Think of some examples

- What is the sign of the income elasticity of demand for fresh fruit and vegetable consumption?
- Give an example of a normal good and an inferior good

Cross-Price Elasticity of Demand

How much does your demand for pluots change when the price of apricots increases?

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How much does your demand for pluots change when the price of apricots increases?

$$E^D_{XY} = \frac{\%\Delta Q^D_X}{\%\Delta P_Y}$$

- The responsiveness of quantity demanded of good X to price of good Y
- If E^D_{XY} is positive, are X and Y substitutes or complements?

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Policy examples, please!

What We Did This Class

1. Non-linear demand curves
2. Defining elasticity
3. Why elasticity matters for policy
4. Many kinds of elasticity