LECTURE 5

5 February 2013

ANNOUNCEMENTS

- HW 2 due Friday at 11:45 PM
- Aplia book grace period ends in 6 days
- Office Hours tomorrow Hanson Hall **3-125**, 1 - 3 PM
- Early spring!

DEMAND, SUPPLY, AND THE MARKET

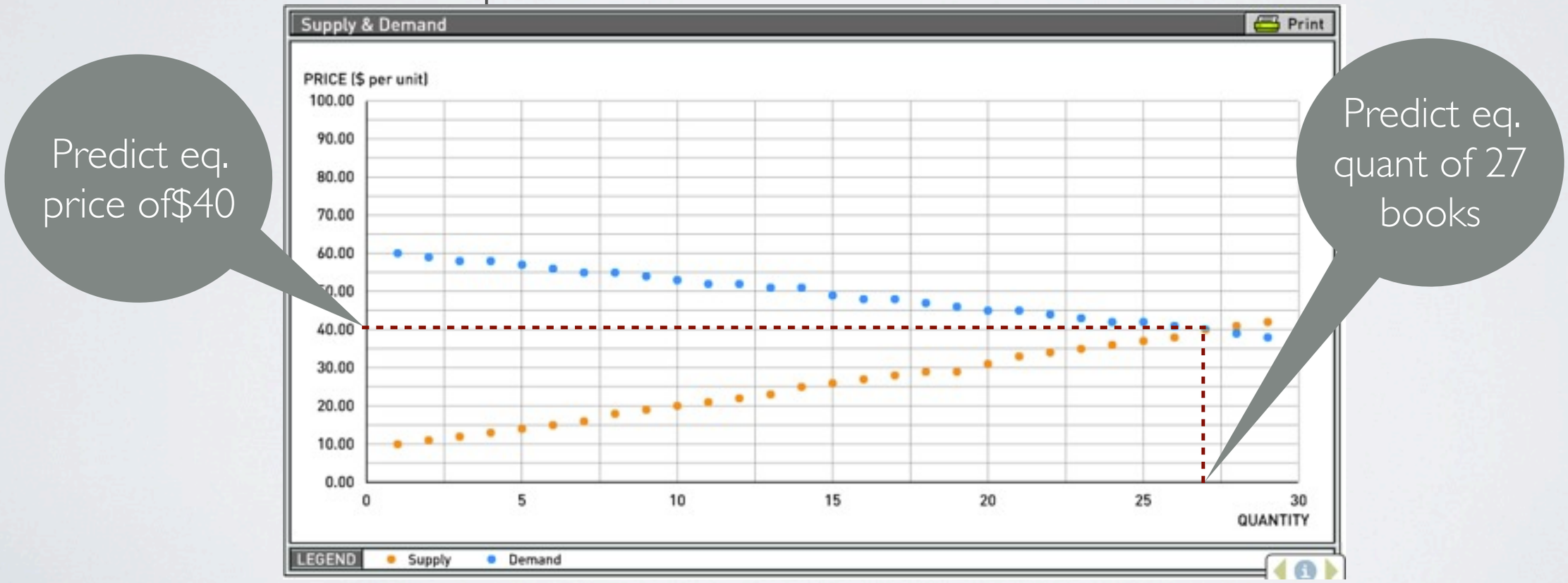
Book Market in Soho, London

AUCTION RESULTS

- What strategies did you employ to maximize your profits?
- Recall our definition of profit:
  - Buyer profit: valuation of the product minus the price
  - Seller profit: price minus the cost of the product
- Aplia distributed different valuations to attempt to imitate real-world situations
- Did different valuations change your strategies?

AUCTION RESULTS

- Recall that buyer valuation of the product (buyer's reservation price) and seller cost (seller's reservation price) yield all the information we need to discuss equilibrium



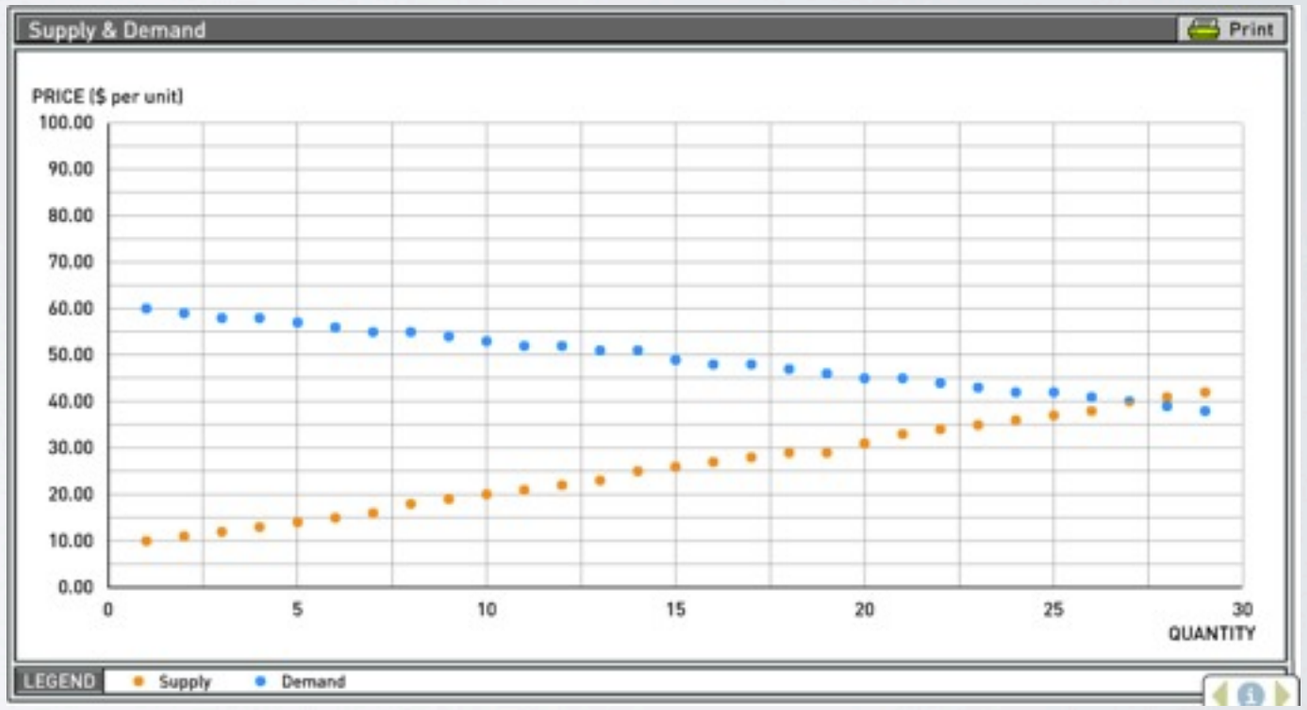
- Reservations prices are used to construct supply and demand curves

ANALYZING THE MARKET

- We want to specify what the market will produce in different structures
- What are the requirements for the competitive market?
- From supply and demand in our competitive market,
  - We can see the **competitive equilibrium price** is $40
  - The **competitive equilibrium quantity** is about 27
- Eventually we will contrast this with monopolies and oligopolies

ANALYZING THE MARKET

- At the competitive price:
  - What was the maximum possible buyer profit?
  - What was the maximum possible seller profit?
  - Average profit between them is ($20+ $30)/2=$25
  - What would be profit for consumers with valuation 40?
- Overall average profit per student should be $12

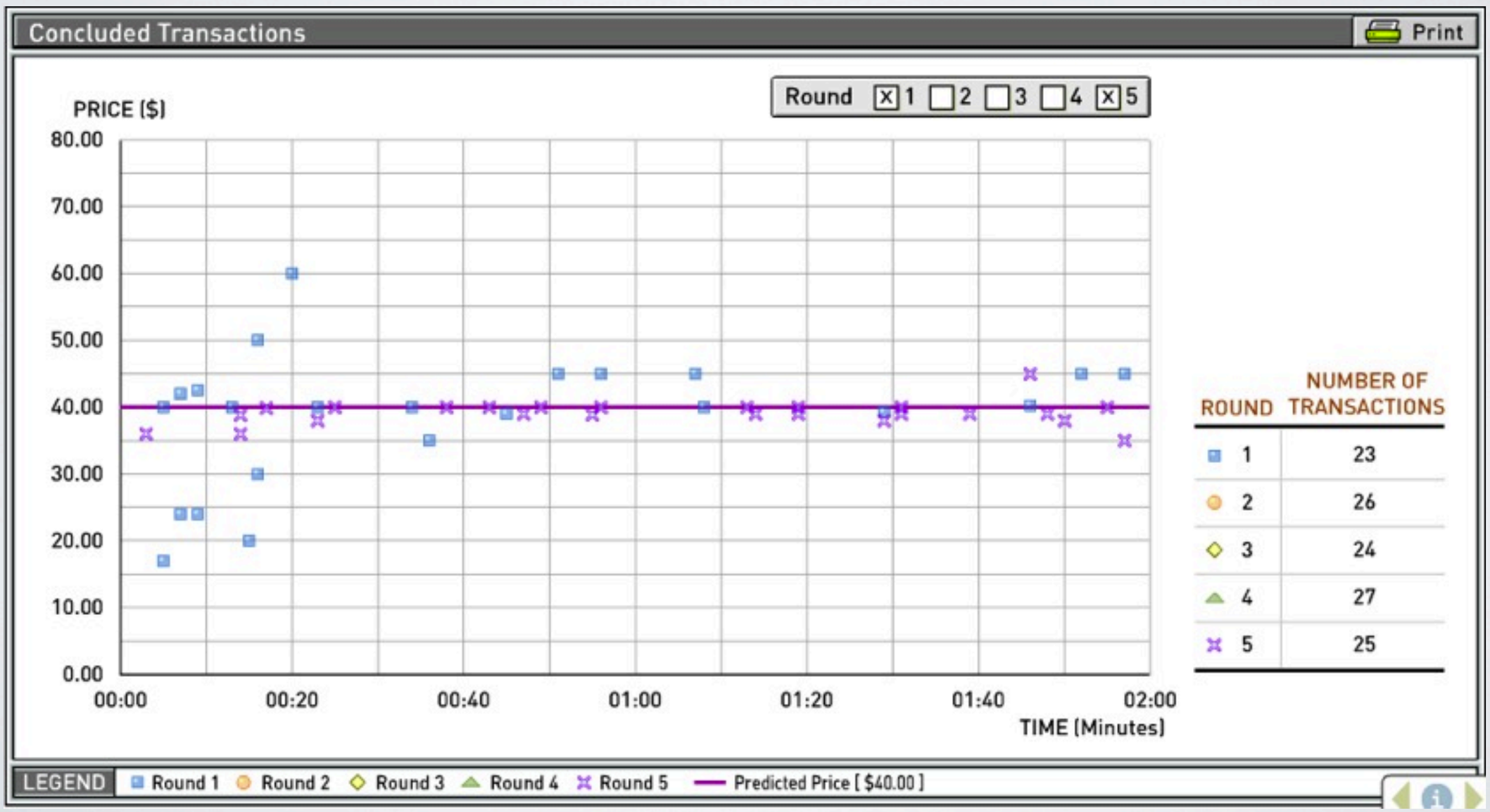


COMPARE MODEL TO REALITY

- The following graphs depict the actual trades made in our auction

COMPARE MODEL TO REALITY

- By the final trading rounds, what price and quantity patterns emerged?



COMPARE MODEL TO REALITY

- Except a few initial jumps, we see that with time **prices converged to the competitive equilibrium price**
  - Initially, we have prices skewed far above an below $40, why?
  - What are some theories why these odd prices disappeared by the ffith round?
- **In our simulated market we saw a price around $40 for the books and quantity of 25-27, very close to what the model predicts**

AVERAGE REALIZED PROFITS

- Recall that average profits (over buyers and sellers) should be $12 in our market
- The table shows that we are pretty close
- So in *nearly ever respect our experiment matched every prediction of the simple competitive market model*
- **The invisible hand is indeed at work! (?)**

Round	Average Seller Profit	Average Buyer Profit	Average Profit
1	$11.00	$9.38	$10.19
2	$12.39	$9.85	$11.12
3	$10.88	$10.22	$10.55
4	$13.55	$9.76	$11.66
5	$13.22	$8.98	$11.10
Total	$12.21	$9.64	$10.92

REWARD: REAL PROFITS

- Who played the best? (Made the most profit)
  - Measure profit and adjust taking into consideration low seller cost and high buyer valuations
  - Buyer adjusted profit: actual profit - profit made if book sold at $40
  - Seller adjusted profit: actual profit - profit made if book sold at $40
- Buyers get one point for every dollar below $40 you bought the book at
- Sellers get one point for every dollar above $40

Example: Buyer with valuation $56 buys at $38	
Actual Profit	$56 - $38
Profit at $40 Price	$56 - $40
Adjusted Profit	$2

REWARD: REAL PROFITS

- Who are our superstar traders?

Name	Excess Gain	Rank
Aaron Waldrep	$25	1
Thomas Grundmeyer	$23	2
Zeng Zejiang	$21	3
Jillian Thatcher	$21	3

- All participants get 3 bonus points
- Winners win metal Washingtons

ASIDE: ECONOMIC EXPERIMENTS

- What would make an economic 'experiment' different than that in chemistry?
- Suppose we want to test what the shape of the demand curve is?
  - In hard sciences experiments **control** for other variables that are not of interest
  - In economics we look at real markets, and we cannot control everything as we like
- Generally, 2 solutions
  - Find very clever statistical methods to use real world information to make fake experiments
  - Sometimes manufacture experiments to test small hypotheses: more successful auction participants are in the business school?

TOPIC 3

Elasticity

BIG PICTURE

- How can we measure the degree by which demand moves in response to price (versus direction)?
- What are the different generic cases for price and income elasticity of demand and their intuitive interpretations?
- What assumptions must be satisfied to measure demand elasticity?
- How does elasticity change in the long run versus the short run?
- What factors affect elasticity?

BASIC DEFINITIONS

iPhone purchase line: We might find iPhones are relatively price inelastic

DEMAND CHANGES

- Lectures 3-4 discussed how quantity demand and demand **moves** in response to several conditions:
  - **Law of demand**: Price increases, Q(D) decreases
  - Any other factors affecting demand cause a SHIFT in the demand curve
  - E.g. - income increases cause demand to increase (shift right)
- Do we know **how much** demand moves?
- The former is a question of direction of change; this is a question of magnitude
- We will consider changes in price, income, and prices of related goods and their impact on demand (and for supply)

ELASTICITY

- Suppose I want to compare change in demand when I change price for the following two goods:

  1. iPhone

  2. Diet Coke

- How could I measure the change in demand caused by a change?
  - Slope is one option, then $\frac{\Delta Q^D}{\Delta P} = \frac{Q_2^D - Q_1^D}{P_2^D - P_1^D}$
  - For iPhones, I then have #iPhones/$
  - For Diet Coke, I have #Diet Coke/$
- What's the problem?

ELASTICITY

- The problem with slope is that it leaves units. How can I compare Diet Cokes with iPhones?
- Economists have focused on **percentage changes** to remove the units
- The *percentage change in demand caused by a percentage change in price* is **price elasticity of demand**, e(D):

$$e^D = -\frac{\%\Delta Q^D}{\%\Delta P}$$

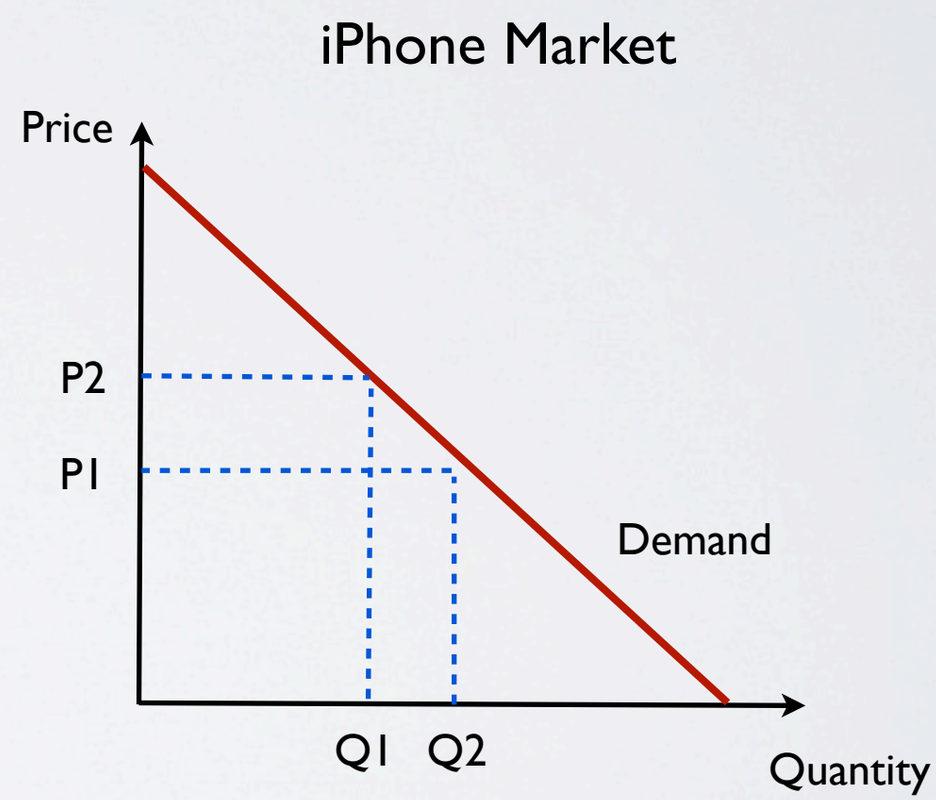
- Why negative?
  - Remember as price increases, demand decreases so $\frac{\%\Delta Q^D}{\%\Delta P}$ will be negative
  - Negative in front simply makes the term positive

ELASTICITY

- How do we calculate the percentage change?
- Use the midpoint method!
  - Suppose we observe price and quantities (P,Q)=(1,2),(3,1)
  - Aside: There are several methods to calculate the change, the midpoint method ensures that the same number comes out regardless of which P,Q pair was first
- Calculation $$-\frac{\%\Delta Q^D}{\%\Delta P} = -\frac{\frac{Q_2-Q_1}{.5(Q_2+Q_1)}}{\frac{P_2-P_1}{.5(P_2+P_1)}}$$
- Intuitively, the percent change of X is simply (Change in X)/(Average X over that change)

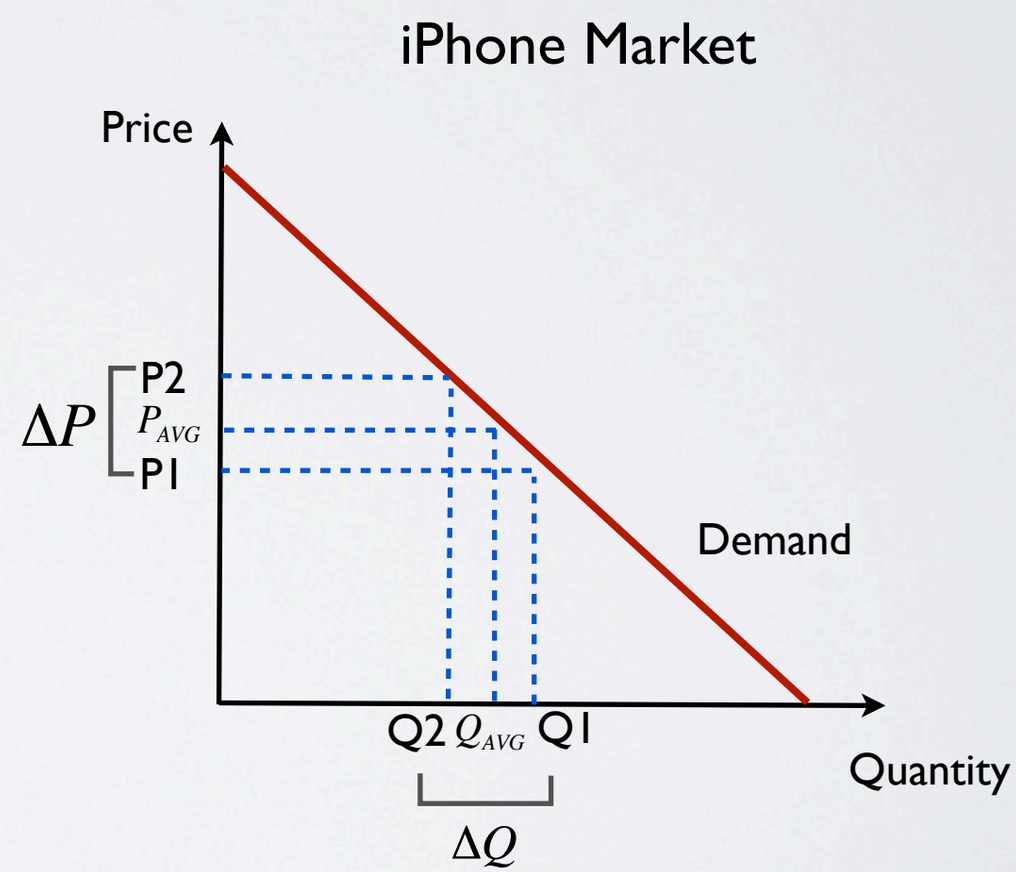
GRAPHICAL ANALYSIS

- Second major point to take home: PRICE ELASTICITY OF DEMAND IS NOT SLOPE OF DEMAND
- Let's look at a demand curve and derive elasticity



GRAPHICAL ANALYSIS

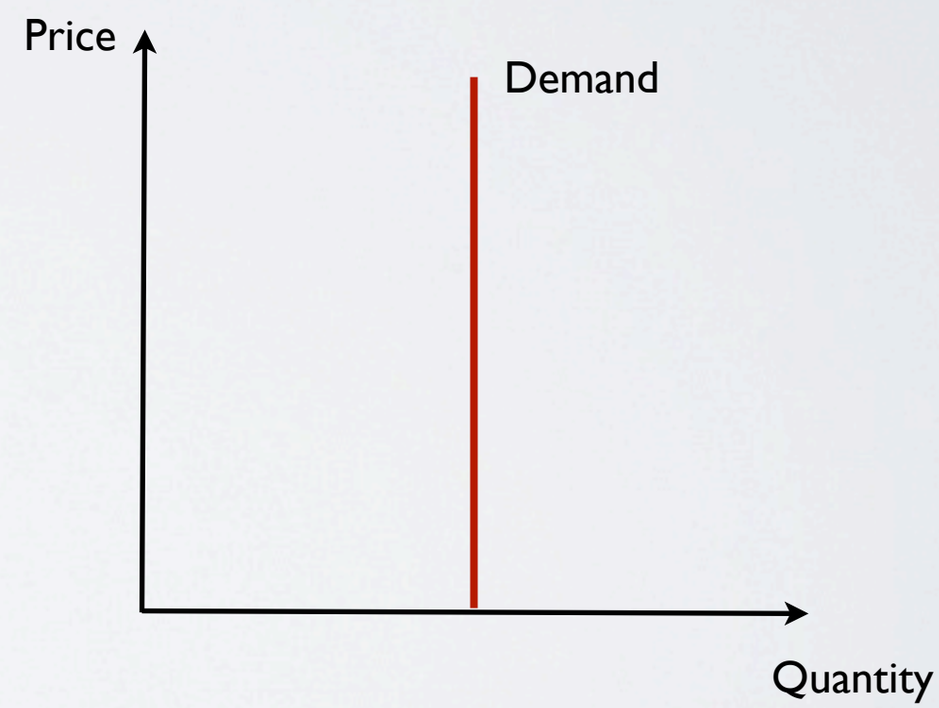
- The change in P and Q is simply the difference of P2 and P1 for P, same for Q
- The average price and quantity is simply the midpoint of the two observations for price and quantity
- Percentage change of P or Q is derived from these two numbers



CASES OF ELASTICITY

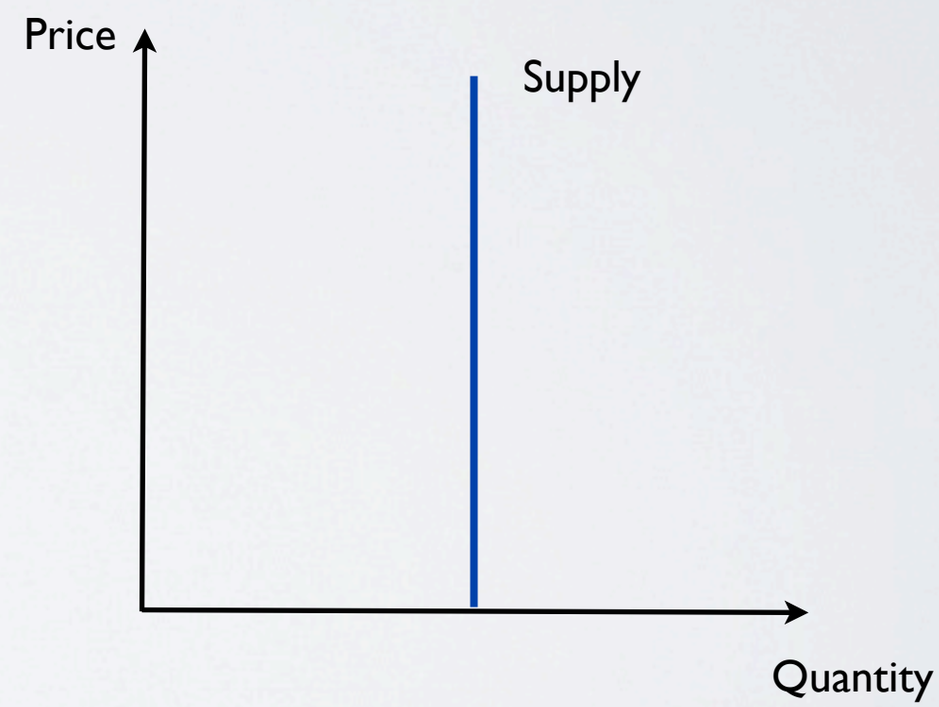
PERFECTLY INELASTIC DEMAND

- Demand is **perfectly price inelastic** if no change in price results in a change in demand
- In this case $e^D = 0$
- Examples?
  - Insulin medication
  - Required books



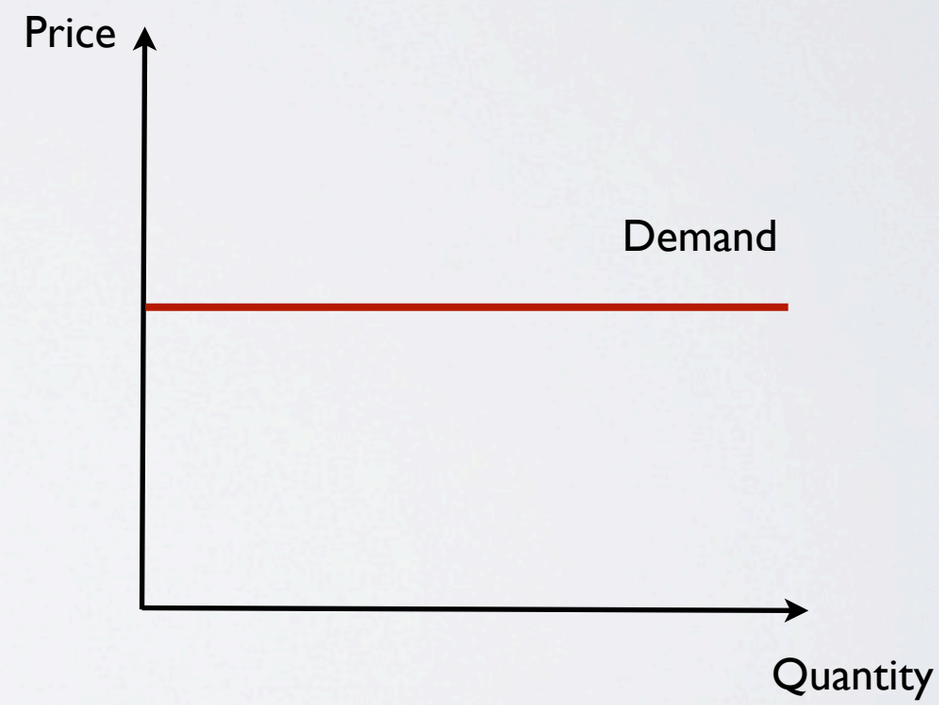
PERFECTLY INELASTIC SUPPLY

- Supply is perfectly price inelastic if quantity supplied is the same for all prices
- In this case $e^S = 0$
- Examples?
  - Concert seats (mostly)
  - Steve Job's personal Macs



PERFECTLY ELASTIC DEMAND

- Demand is **perfectly price elastic** if at a specific price, consumers will buy any amount of the good
- Any change in price causes demand to fall to 0
- In this case $e^D = \infty$
- Typically think of this from the supplier perspective
  - No matter how much I produce, I will get the same price on the market
- Other examples?



OTHER CASES

- Other cases fall in between the extremes but are less intuitively appealing
- If $e^D < 1$ then demand is **inelastic** (% change in P larger than % change in Q)
  - Result is that total spending=P*Q increases with P
  - Intuitively fall in Q must be smaller than rise in P for $e^D < 1$
- If $e^D > 1$ then demand is **elastic**; result is that total spending falls with P (% change in P smaller than % change in Q)
- If $e^D = 1$ then demand is **unit elastic**; result is that total spending is constant in P (% change in P same as % change in Q)

EMPIRICAL EXAMPLE

How do we expect price elasticity of gas to look?

ELASTICITY OF GASOLINE

- Do you think price elasticity of gas demand is high (elastic) or low?

Take as quantity demanded

Take as price

Time	Daily Consumption of Motor Gas / Capita	Average Price per Gallons in Dollars
June 2007	1.32	3.05
June 2008	1.26	4.07
Change	-0.06	1.02
Average of Both Years	1.29	3.56
Percent Change	-0.05	0.28

$$-\frac{\%\Delta Q^D}{\%\Delta P} = -\frac{\frac{Q_2-Q_1}{.5(Q_2+Q_1)}}{\frac{P_2-P_1}{.5(P_2+P_1)}}$$

$$= -\frac{\frac{-0.06}{1.29}}{\frac{1.02}{3.56}}$$

$$= \frac{.05}{.28}$$

$$= .16$$

ELASTICITY OF GASOLINE

- Because e(D)=.16<1, gasoline is **price inelastic**
- As price increases, does total expenditure on gas rise or fall?
  - Recall that total expenditure rises with price for inelastic goods
- What kind of assumptions are we making to do this sort of calculation?
  - As always ******, we are assuming everything else affecting demand is constant ******
  - If not, our calculation will pick up the effect of other determinants of demand
- We can go through several steps to check that these assumptions are satisfied

ESTIMATING ELASTICITY

- First, supply had to change too in our observations. Why is what we measured not elasticity of supply?
- Suppose the market looks like the graph to the right:
- If this is the case, did we measure elasticity of demand or supply?