The Marketer's View of Demand and Setting Price compared to the Economist's View of Price Setting and Using Price Elasticity

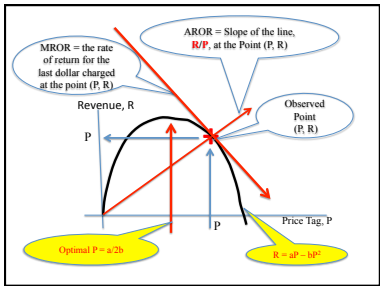
Ted Mitchell

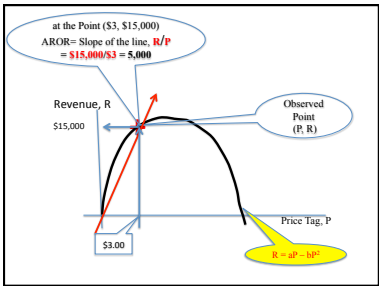
Learning Objectives for Today
To KNOW

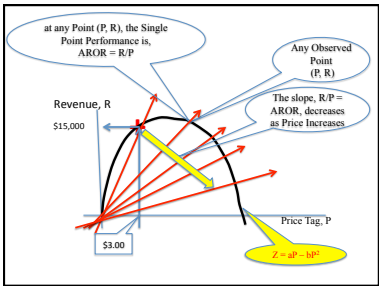
- 1) Why the **A**verage **R**ate **O**f **R**eturn on Price, **AROR**, is the average rate at which Revenue is being Returned on size of the Price Tag,
- 2) Why AROR is usually called the **Demand Curve**
- 3) Key Differences between the Marketer's View of Setting Price and the Economist's View of how Prices Get Set
- 4) How to Calculate and Use Price Elasticity

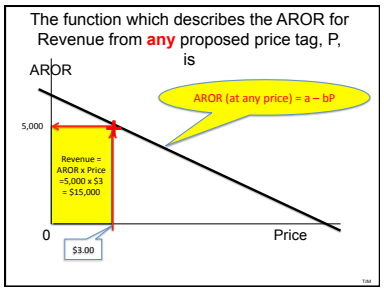
Two Rates of Return with Two Approaches for Estimating Them

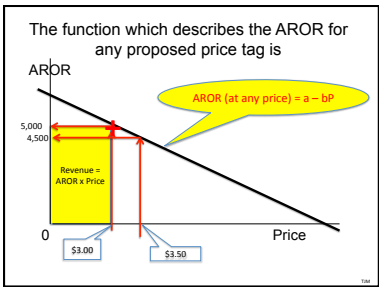
	Average Rate of Return AROR (of revenue on price tag)	Marginal Rate of Return MROR (of revenue on price tag)
Simple empirical observation (s)	A Single Performance, AROR = R/P	An Incremental Performance, MROR = ΔR/ΔP
Revenue as a Function of Price, R = ƒ(P) R = aP – bP²	AROR = ƒ(P)/P AROR = (aP – bP²)/P AROR = a – bP	MROR = the first derivative of the Revenue function w.r.t. Price dR/dP = a – 2bP









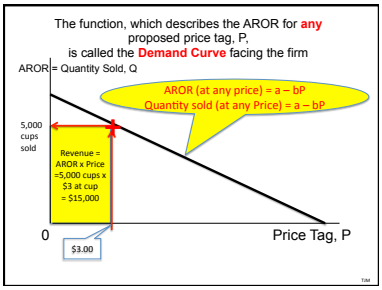


How did we get the function that describes the AROR at any price?

- We know
  1) at a single point (P, R) of observed performance we calculate the AROR at that point as the slope, **R/P**
- 2) we know the Revenue function, R = ƒ(P) that describes the amount of Revenue for any proposed price has been given to us as Revenue function, R = aP – bP²
- In the calculated slope, **R/P**, replace the single observed point, **R**, with the function, R=ƒ(P), and let the observed price, **P**, be any proposed Price
- ƒ(P)/P = AROR (at any proposed price) = (aP – bP²)/P
- AROR (at any proposed price) = (a – bP)

The AROR (of Revenue on Price tag)

- Is **JUST** a number
- The slope at a single point ($3, $15,000) is a rate **R/P** = **$**15,000/**$**3
- The dollar signs cancel out, 15,000/3 = 5,000
- The Slope, R/P, is a value free rate
- it could be made into a percent, 500,000%
- Marketers and Economists want the number to be reified so they give it a name, **Quantity Sold**
- From Accounting we remember that the Price tag, P, times the Quantity sold, Q, = the Sales Revenue, R
- Revenue, **R** = Selling Price, **P** x Quantity Sold, **Q**
- Quantity Sold, **Q** = **R/P** = **5,000 cups sold at $3 each**



The **Demand Curve** Facing the

- Marketing Manager, as he chooses his price, is downward sloping because his offering is differentiated from the competitor's offering by the attributes of the Product, the Promotion and the Place , he uses to create customer value for his prospective customers

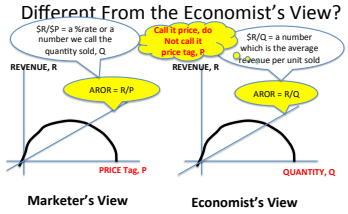
Two Rates of Return with Two Approaches for Estimating Them

	Average Rate of Return **AROR (on Price) is called the Firm's Demand Curve**	Marginal Rate of Return **MROR (on Price)**
Simple empirical observation (s)	A Single Performance, **Quantity sold, Q = R/P**	An Incremental Performance, MROR = ΔR/ΔP
Revenue as a Function of Price, R = f(P) R = aP – bP²	Q = f(P)/P Q = (aP – bP²)/P **Quantity sold, Q = a – bP**	MROR = the first derivative of the Revenue function w.r.t. Price dR/dP = a – 2bP

Learning Point #2

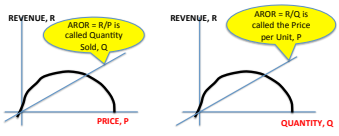
- How is The Marketer's View of Setting Price Tags
- Different
  From the Economist's View of Prices are determined?

How is The Marketer's View of Price Different From the Economist's View?



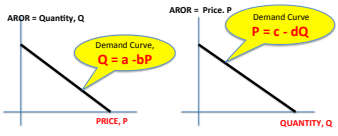
Marketer's View **Economist's View**

How is The Marketer's View of Price Different From the Economist's View?



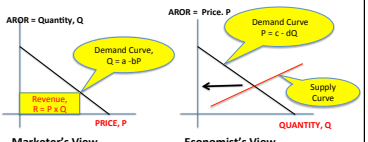
Marketer's View **Economist's View**

When the AROR is shown as a function its called a **Demand Curve**



Marketer's View **Economist's View**

In the Economist's View, Marketers Should Not exist because the **Price** is determined by buyers and sellers choosing quantities

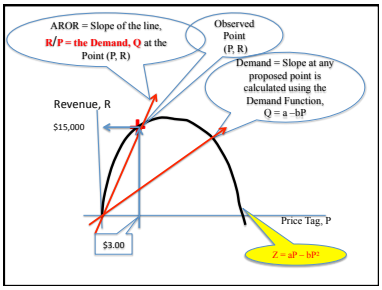


Marketer's View
Sellers Choose Prices Given a Demand for their Product

Economist's View
Nobody chooses Price
There is an invisible hand

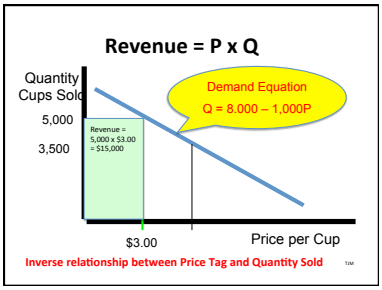
Learning Objective #3

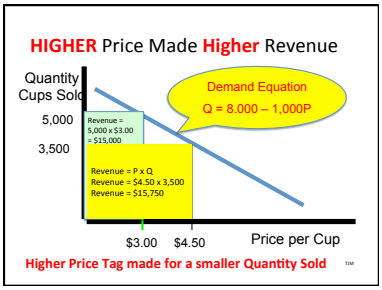
- Price Elasticity and Its Uses to Marketing Managers

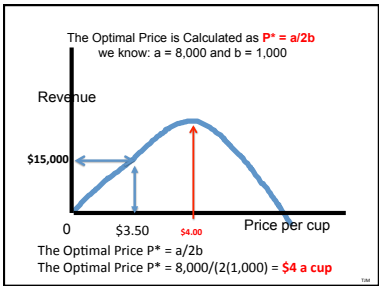


Example of Exam Question about Demand or Quantity Sold, Q

- Given Demand Equation, Q = 8,000 – 1,000(P)
- **1)** What is the forecasted number of cups sold when the price tag per cup is $3?
- Answer
- Q = 8,000 – 1,000($3) = **5,000** cups
- **2)** What is the forecasted number of cups sold if the price tag per cup is $4.50
- Answer:
- Q = 8,000 – 1,000($4.50) = **3,500** cups
- **Higher Price Tag sells Fewer Units**

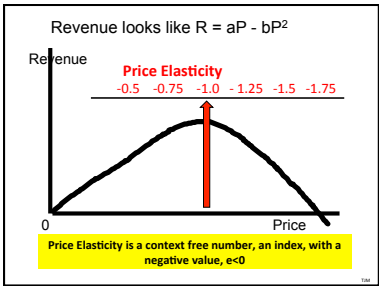


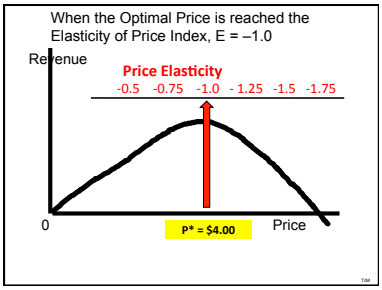




When we do **NOT** know

- The Values of **a** and **b** in the Profit Function
- Profit Function, R = **aP – bP²**
- **When Mitchell Has Retired!**
- **Then you Need a Number or Index called Price Elasticity**
- It doesn't need the values **of a and b**





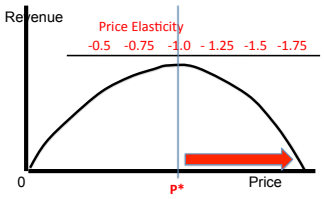
Example of Interpreting

- Price elasticity
- Market research has estimated that the price elasticity in the market is e =-2.5
- This means that a 1% increase in the current price, P, will result in a 2.5% decrease in the current average rate of revenue being returned per dollar of price tag, AROR
- **This means that a 1% increase in the current price, P, will result in a 2.5% decrease in current quantity being sold at the current Price!**

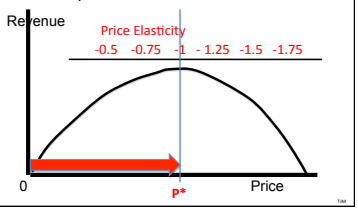
A very important thing that elasticity is used for

- Estimating when an increase in the price tag, P will result in an increase or a decrease in the revenue, R

When elasticity is a bigger negative number than -1.0, (e ≤ -1.0) then a price increase decreases revenue



When elasticity is a smaller negative number than -1.0, (0 > e ≤ -1.0) then a price increase increases revenue



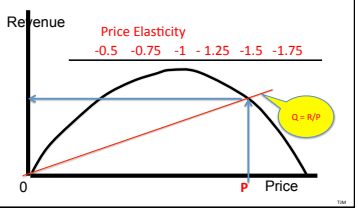
If we had a way to calculate price elasticity

- we would know if revenue would increase or decrease with a proposed price increase!

Definition of Price Sensitivity

- Definition of Price Elasticity (using Quantity sold) $e_{qp} = \%\Delta Q/\%\Delta P$
- $e_{qp} = (\Delta Q/Q)/(\Delta P/P)$
- $e_{qp} = ((Q_2 - Q_1)/Q_1) / ((P_2 - P_1)/P_1)$
- It is a context free number, an index, with a negative value, e<0

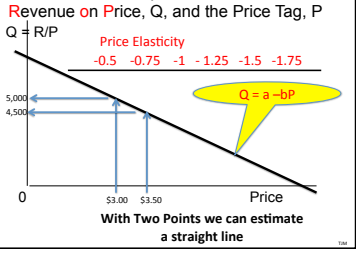
Quantity sold, Q is the average rate at which revenue is being returned at a price point, P, or Q = R/P



We need an estimate of elasticity

- We **CAN** estimate price elasticity from **two observations**
- Taking advantage of the Linear relationship between the Quantity Sold, Q and the the Price tag, P
- Demand Curve, Q = a -bP

Linear relationship between the rate of Revenue on Price, Q, and the Price Tag, P



With Two Points we can estimate a straight line

Estimating Price Elasticity from Two Observations

	Performance 1	Performance 2	Difference	Percentage Change
Price Tag, P	P_1	P_2	$\Delta P = P_2 - P_1$	$\%\Delta P = \Delta P/P_1$
Q = R/P = AROR	Q_1	Q_2	$\Delta Q = Q_2 - Q_1$	$\%\Delta Q = \Delta Q/Q_1$
Revenue, R	R1	R2	$\Delta R = R_2 - R_1$	

Estimating Price Elasticity,
e = $\%\Delta Q/\%\Delta P$
e = $(\Delta Q/Q_1)/(\Delta P/P_1)$
e = $(Q_2 - Q_1)/Q_1) \div (P_2 - P_1)/P_1$

Example: Calculating Price Elasticity

- You have been operating your business for two periods.
- In Period 1 your selling price was $3.00 a cup And you earned $15,000 in revenues
- In Period 2 your selling price was $3,50 a cup And you earned $15,750 in revenues
- What is your estimated price elasticity?
- Will your revenue increase or decrease if you decrease your selling price?

First set up the table

	Performance 1	Performance 2		
Price Tag, P	P_1 = $3.00	P_2= $3.50		
Q = R/P	$R/P = Q_1$= $15,000/$3 = Q_1= 5,000 cups	$R/P = Q_2$ = $15,750/$3.5 Q_2 = 4,500 cups		
Revenue, R	R_1 = $15,000	R_2 = $15,750		

First set up the table

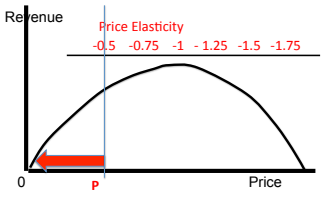
	Performance 1	Performance 2	Difference	Percentage Change
Price Tag, P	P_1 = $3.00	P_2= $3.50	**$\Delta P = P_2 - P_1$ ΔP = $3.50–$3.00 ΔP = $0.50**	
Q = R/P	$R/P = Q_1$= $15,000/$3 = Q_1= 5,000 cups	$R/P = Q_2$ = $15,750/$3.5 Q_2 = 4,500 cups	**$\Delta Q = Q_2 - Q_1$ ΔQ = 4,500–5,000 ΔQ = –500 cups**	
Revenue, R	R_1 = $15,000	R_2 = $15,750	**$\Delta R = R_2 - R_1$ = $750**	

First set up the table

	Performance 1	Performance 2	Difference	Percentage Change
Price Tag, P	P_1 = $3.00	P_2= $3.50	$\Delta P = P_2 - P_1$ ΔP = $3.50–$3.00 ΔP = $0.50	$\%\Delta P = \Delta P/P_1$ $\%\Delta P$ =50.50/53 $\%\Delta P$ =17%
Q = R/P	$R/P = Q_1$= $15,000/$3 = Q_1= 5,000 cups	$R/P = Q_2$ = $15,750/$3.5 Q_2 = 4,500 cups	$\Delta Q = Q_2 - Q_1$ ΔQ = 4,500–5,000 ΔQ = –500 cups	$\%\Delta Q = \Delta Q/Q_1$ $\%\Delta Q$ = –500/5,000 $\%\Delta Q$ = –10%
Revenue, R	R_1 = $15,000	R_2 = $15,750	$\Delta R = R_2 - R_1$ = $750	

Estimating Price Elasticity, e = $\%\Delta Q/\%\Delta P$
e = –10%/17% = –0.59
Since –0.59 is a smaller negative than –1.0
Then a price increase will increase the revenue

When elasticity is a smaller negative number than -1.0, (0 > e ≤ -1.0) then a price decrease decreases revenue



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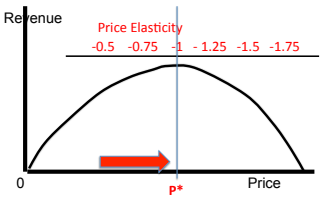

Three things Price Elasticity is used for

- 1) Comparing the price sensitivity of different markets
- 2) Estimating if an increase in the Price tag, P will result in an increase or a decrease in the revenue, R
  Know which way is to maximize revenue
- 3) Forecasting the percentage change in quantity sold, $\%\Delta Q$, given a percentage change in price, $\%\Delta P$

For Midterm #2 Can you Explain why

- AROR (of Revenue on Price) is called the demand curve?
- Can you appreciate why a Marketer's view of setting price is so different from an Economist's view?
- Can You calculate Price Elasticity and Know Why it is a useful number?
- Do you know 3 applications for Price Elasticity?