

CLASS SCHEDULE

[Each class will have two sessions, First session is from 7-8.20 PM. Short break of 10 minutes and then next session from 8.30-9.50PM]

Week#	Session	Class Schedule	Read [R] Submit[S]	Session	Class Schedule	Read [R] Submit[S]
1					Introduction	None
2	1	Introduction		2	New Product Process	[R] HBS 592011-PDF-ENG
3	1	Needs to Design1	[R] Notes on Teams	2	Needs to Design2	[R] Notes on Teams
4	1	Uncovering Needs	[R] Notes on Teams	2	Team Exercise	
5	1	Market Sizing 1	[R] HBS Note 505062-PDF-ENG	2	Market Sizing 2	[R] HBS Note 894007-PDF-ENG
6	1	Concept Testing	[R] HBS Note 590063-PDF-ENG [S] Submit Assignment 1	2	Conjoint Analysis	[R] HBS Note 590059 -PDF-ENG
7	1	Simulated Test Marketing	[R] HBS Note 592088-PDF-ENG	2	Nestle Contadina Case	[R] HBS Case HBS: 595035-PDF-ENG
8	1	Channel Decisions	[R] Notes on Teams [S] Submit Assignment 2	2	Pricing Decisions	
9	1	HOLIDAY				
10	1	Advertising Decisions	[R] HBS Note 599087-PDF-ENG	2	Product Launch	[R] HBS Note 598061-PDF-ENG
11	1	Introducing Brands	[R] HBS Note 8140-PDF-ENG [S] Submit Assignment 3	2	Brand Equity	[R] HBS Note 8140-PDF-ENG
12	1	Brand Extensions	[R] HBS Note 8140-PDF-ENG	2	Brand Social Media	[R] HBS Note R1603B-PDF-ENG
13	1	Brand Positioning	[R] HBS Note 8197-PDF-ENG [S] Submit Assignment 4	2	Exam Review	[R] Notes on Teams
14	1	Project review		2	Product /Brand Mistakes	[R] HBS Note 594127-PDF-ENG
15	1	Exam	7 PM - 8.20 PM	2	Walt Disney Studio Case	HBS Case 516105-PDF-ENG
16	1	Presentation Day		2	Presentation Day	

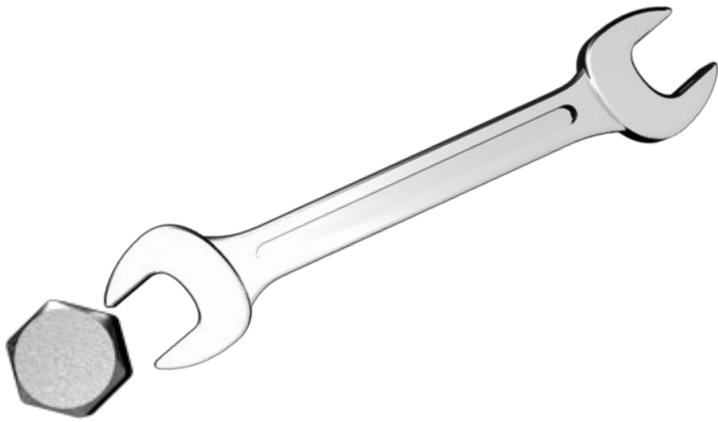
Market Sizing 1

Prof Narayan Janakiraman

New Product Proliferation

An 18-Year Comparison of Consumer Packaged Goods Product Launches

Number of Product Launches	1980	1998
Cereals	34	192
Ice cream, Frozen yogurt	57	556
Spices, Extracts, Seasonings	61	403
Deodorizers, Air refresheners	53	372
Paper towels, Napkins	11	126
Milk, Yogurt drinks	26	255
Coffee	11	384
Beer, Ale	25	187



**New
Markets**

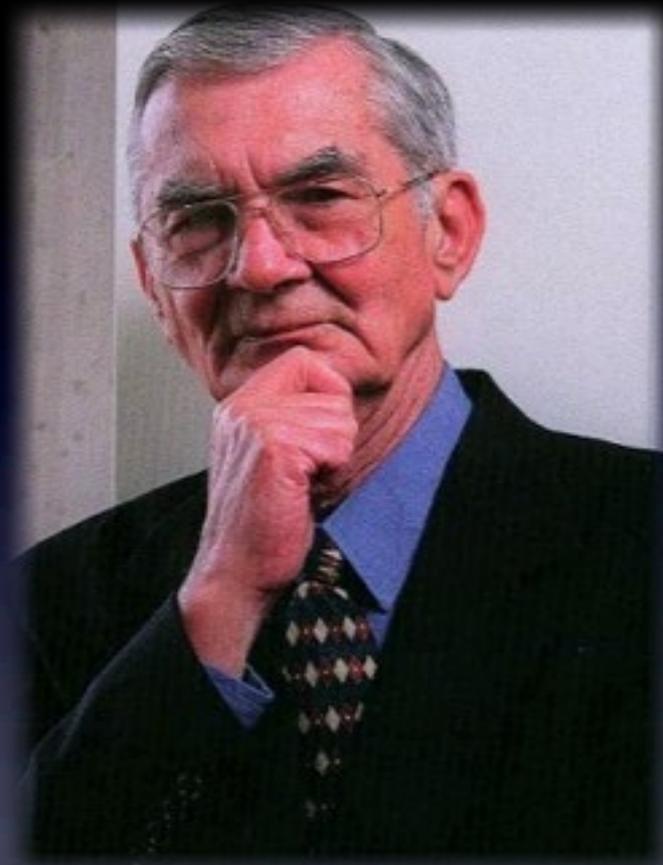
Bass Diffusion Model

**Existing
Products**

**New
Products**

**Time Series
Regression**

**Existing
Markets**

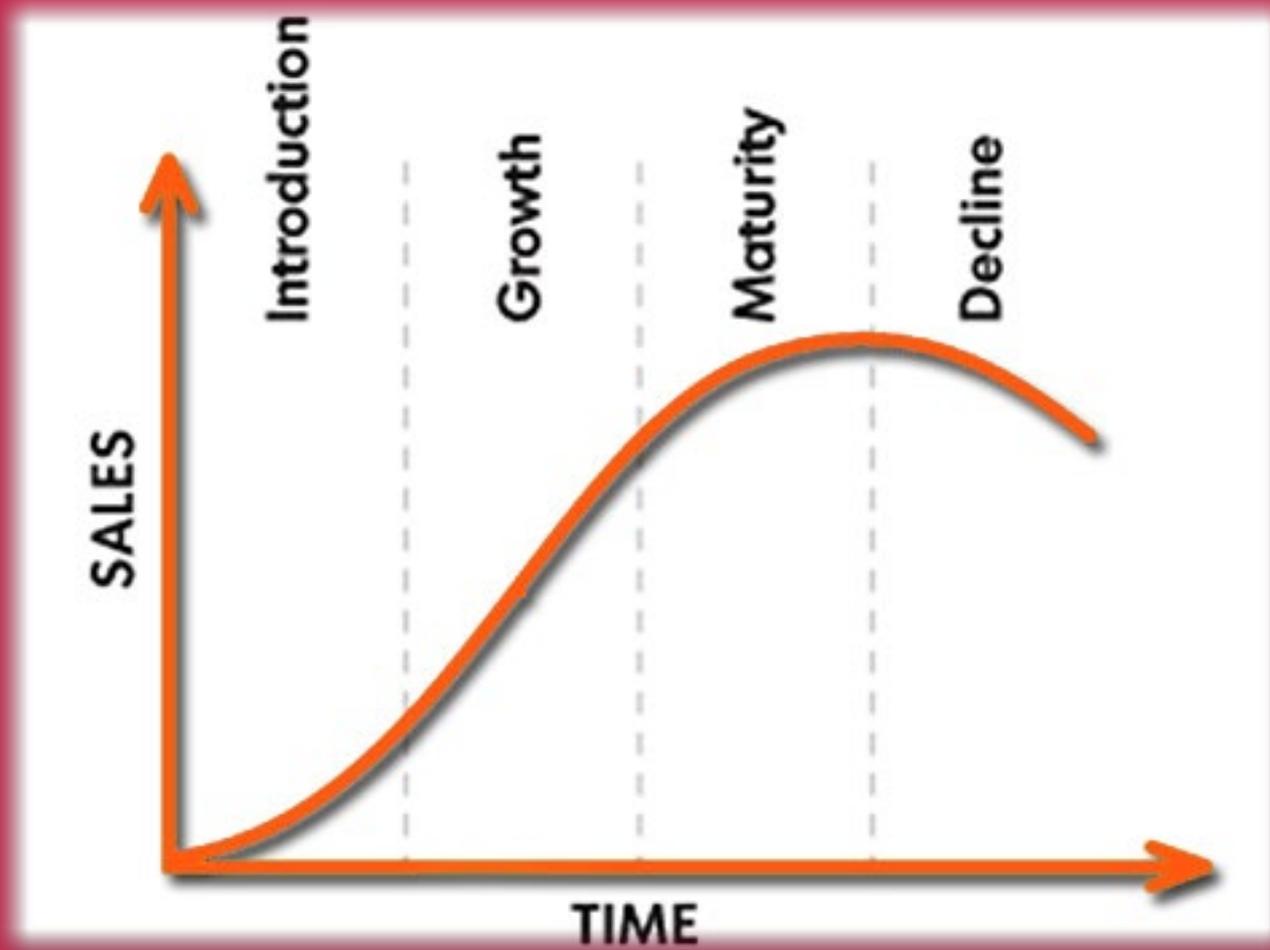


Frank Bass

1926-2006

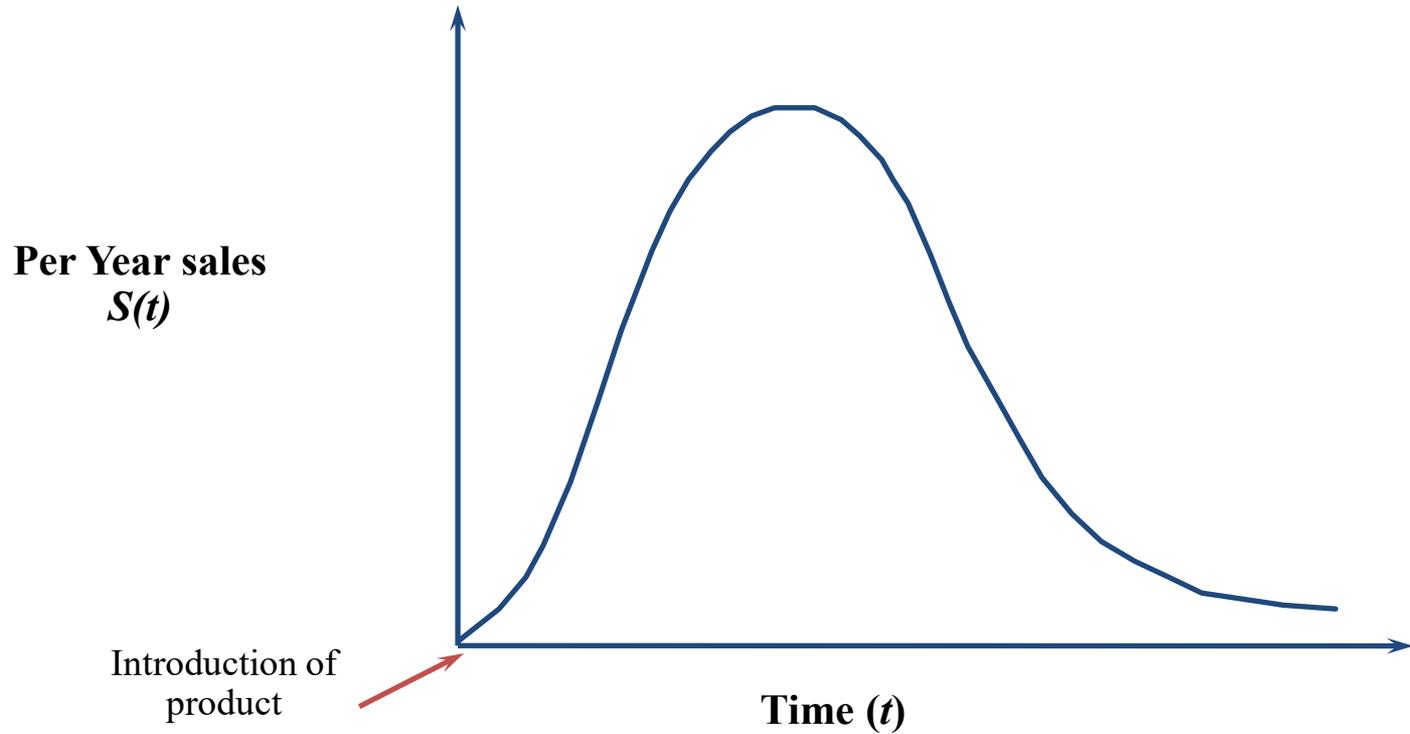
Basics

What is this? and why is it important?



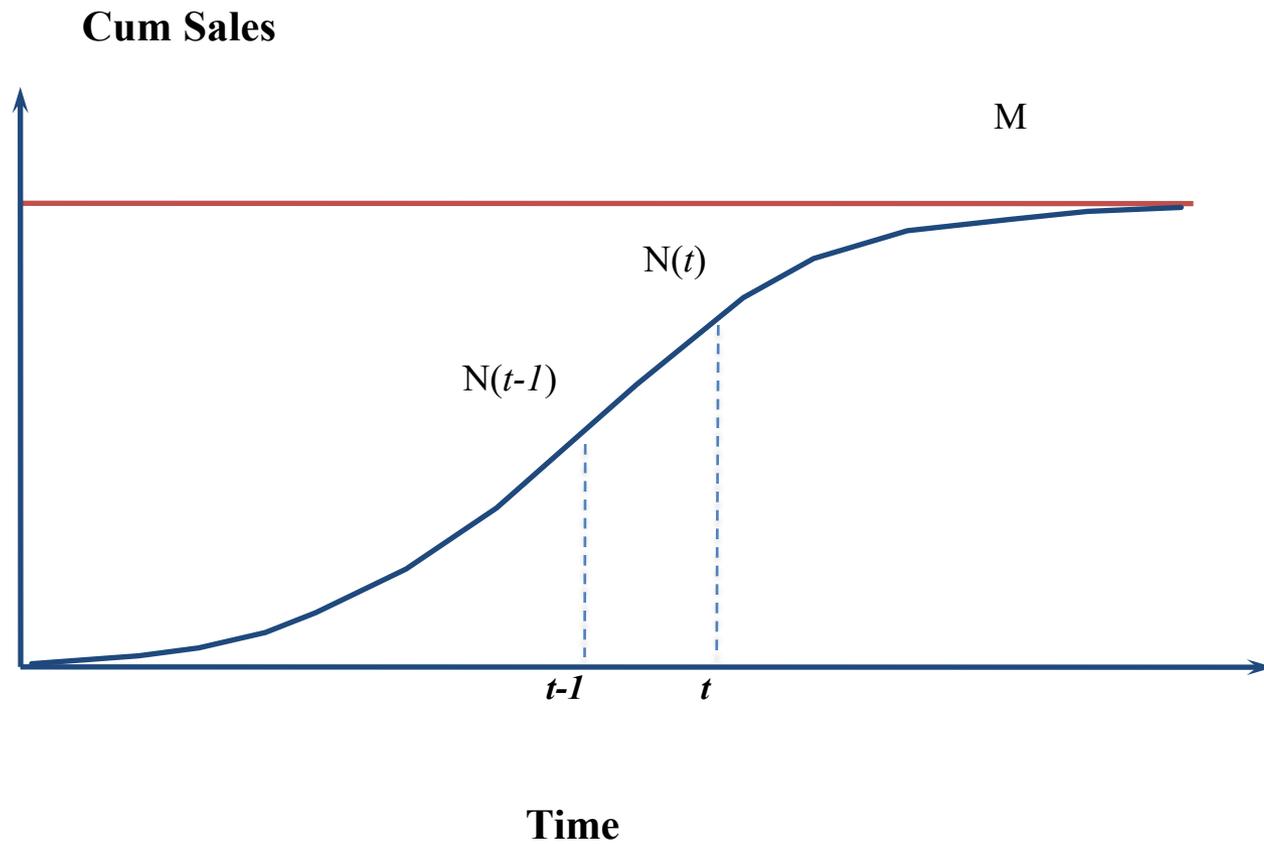
SALES

Bell Shaped Curve



Cumulative SALES

S Shaped Curve



SALES = Probability (1)

*

Remaining
Consumers(2)



1. Probability

Effect of Advertising



p

Effect of Word of Mouth



q

1. Probability

Effect of Advertising



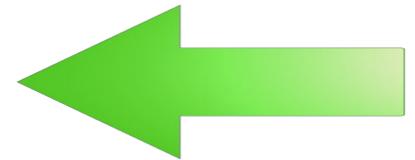
Effect of Word of Mouth



$$p + q * N_{t-1} / M \uparrow$$

2. Remaining Consumers

YEAR	Sales	Consumers Left
1	S_1	M
2	S_2	$M - S_1$
3	S_3	$M - S_1 - S_2$





SALES

=

Probability

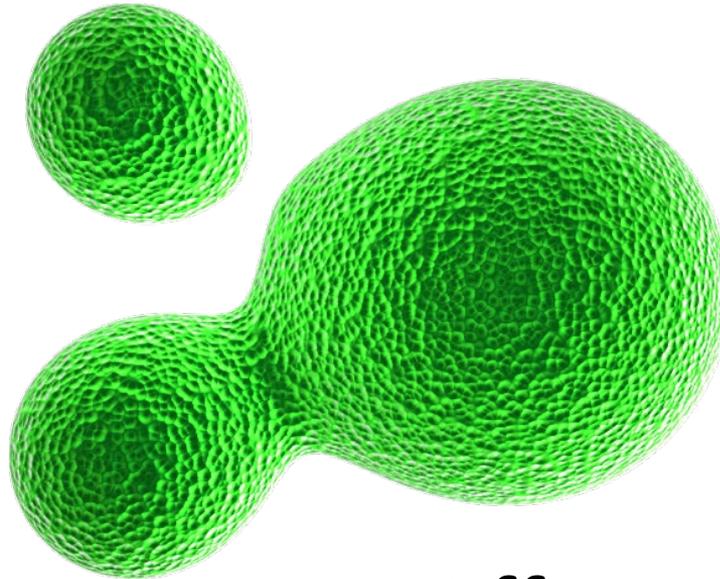
$$\left[p + q * N_{t-1} / M \right]$$

X

$$\left[M - N_{t-1} \right]$$

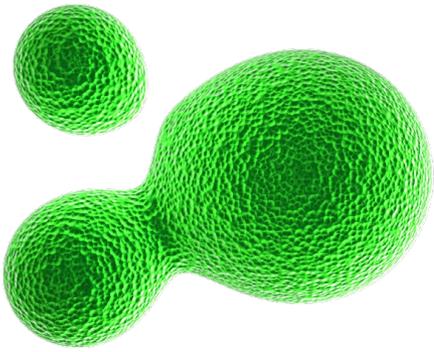
Remaining Consumers

M – Market Potential



p – Effect of Advertising

q – Effect of Word of Mouth



An example

$M = 30$ million

$p = 0.0112$

$q = 0.5$

Year 1

$$\begin{aligned} S_1 &= (\text{Prob}) * (\text{Remaining Consumers}) \\ &= [p + q (N_0/M)] * [M - N_0] \\ &= [p + q (0)] * [M - 0] \\ &= [p] * M \\ &= 0.0112 * 30 = 0.336 = 336,000 \text{ consumers} \end{aligned}$$

Year 2

$$\begin{aligned} S_2 &= (\text{Prob}) * (\text{Remaining Consumers}) \\ &= [p + q (N_1/M)] * [M - N_1] \\ &= [0.0112 + 0.5 * (0.336/30)] * [30 - 0.336] \\ &= 0.498 = 498,000 \text{ consumers} \end{aligned}$$

Note that 498,000 = 332,237 innovators + 165,763 imitator

Year 3,4,5....

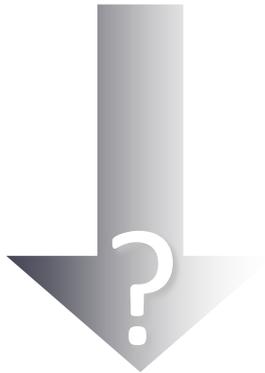
?

$p = 0.01$

$q = 0.5$

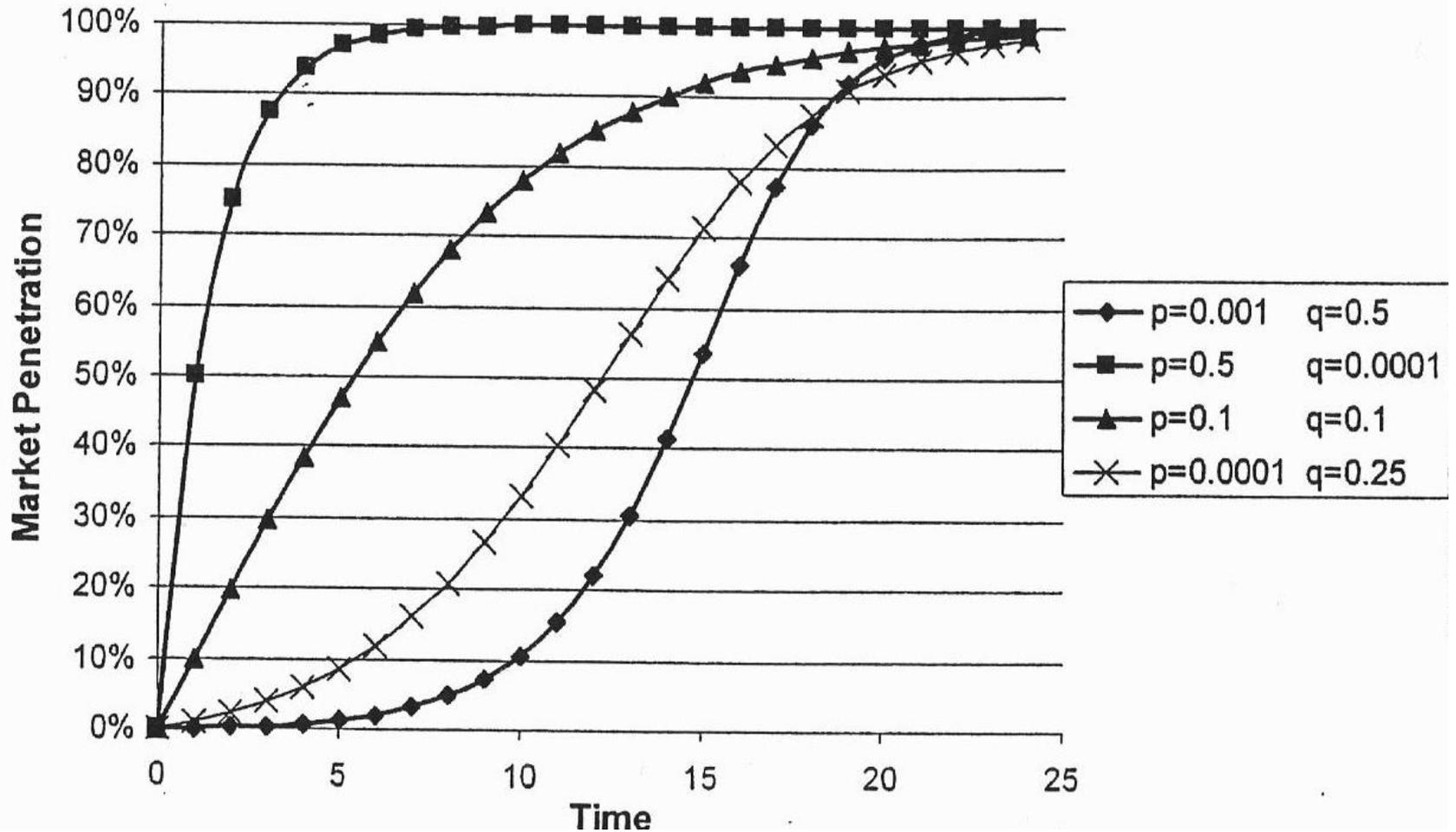


p increases



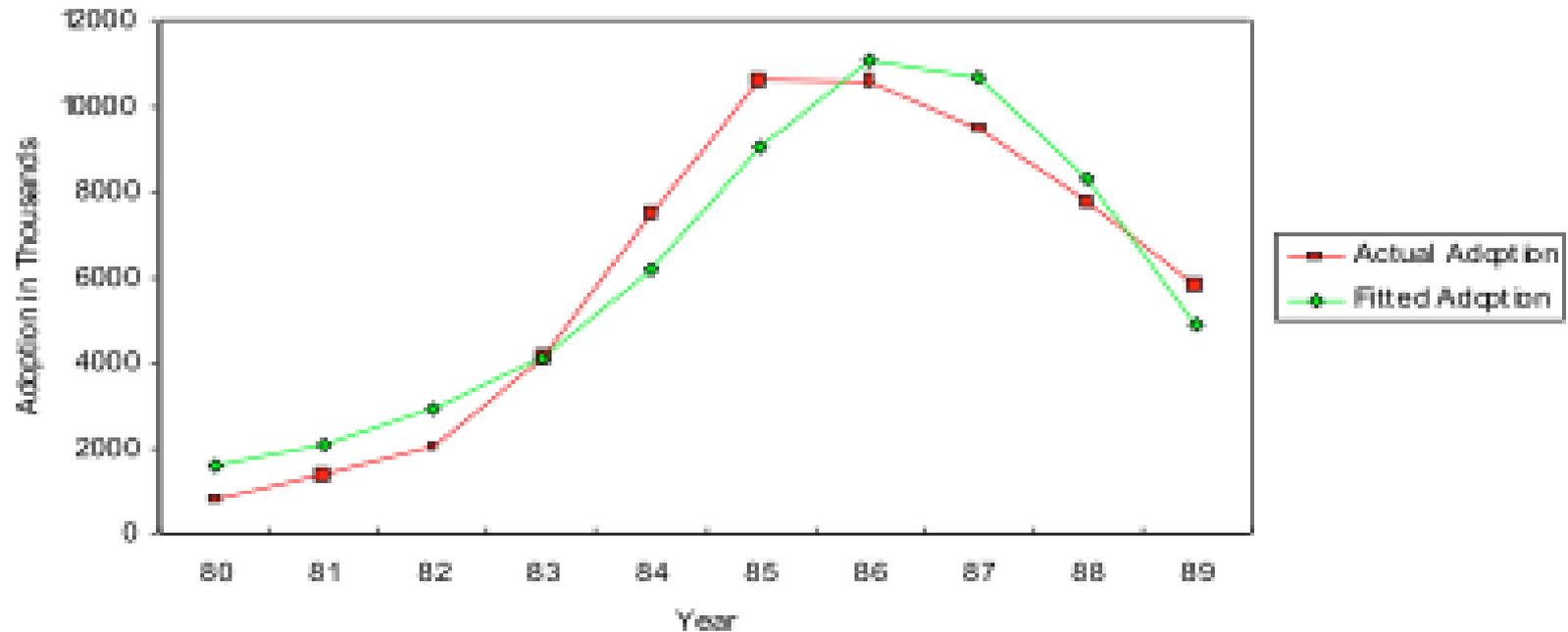
q decreases

Figure A1 Bass Models with Various Levels of Innovation (p) and Imitation (q)

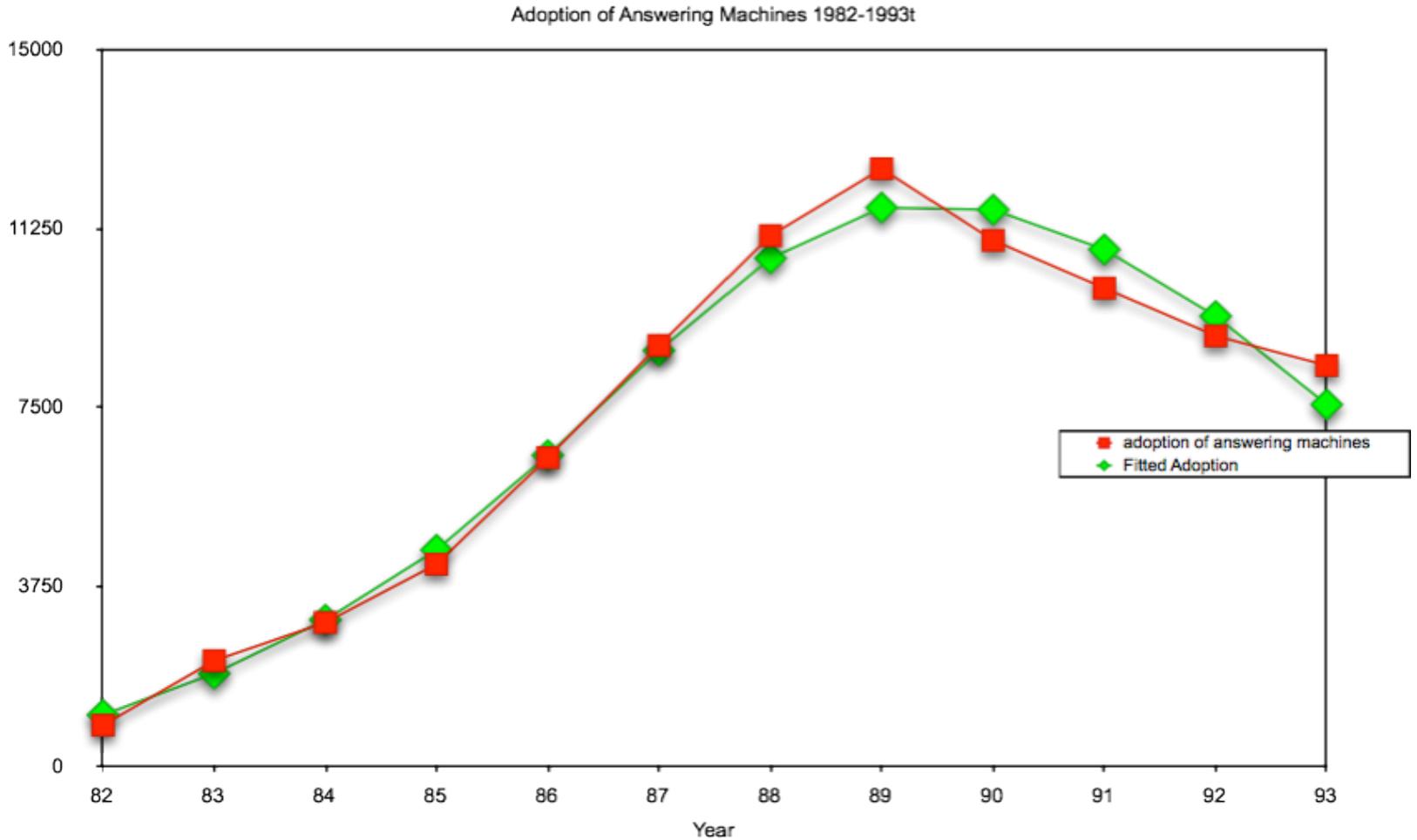


Adoption of VCR's

Actual and Fitted Adoption VCR's
1980-1989

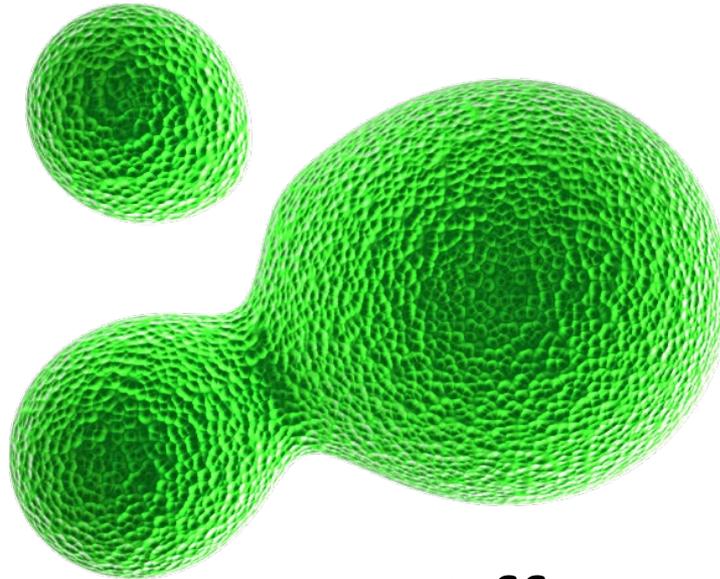


Answering machines



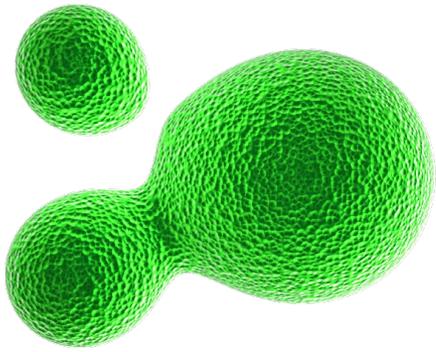
Determining the Bass Diffusion Model

M – Market Potential



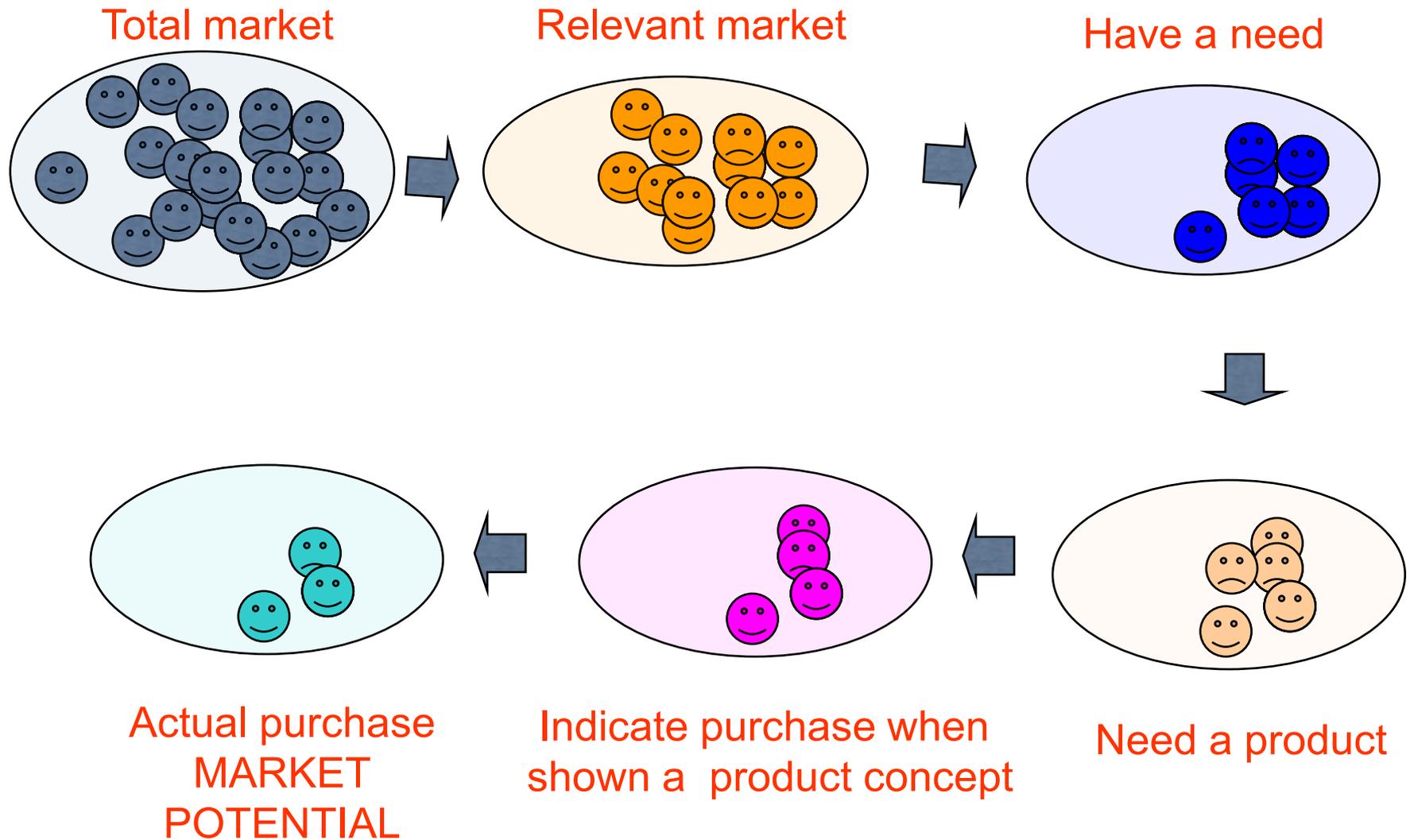
p – Effect of Advertising

q – Effect of Word of Mouth



MARKET POTENTIAL

For each segment we should be able to get...



Example...

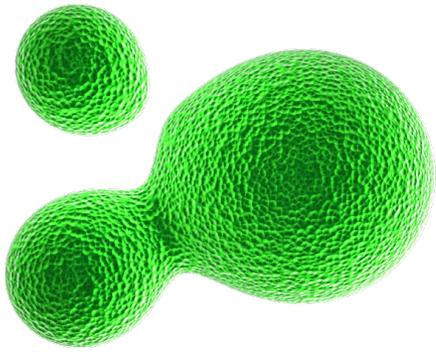
1 Total Market		300.00 mill
		↓
2 Relevant Market	13%	37.50 mill
(Women, aged 20-40)		↓
3 Have a need	25%	9.38 mill
		↓
4 Likely to buy product	25%	2.34 mill
		↓
5 Indicate will buy	25%	0.59
for concept		↓
6 Actually buy	25%	0.15 mill





(2)
Ask Experts

MARKET POTENTIAL



Estimating “p” &
“q”

“p” and “q” for existing products

PRODUCT	Innovation parameter “p”	Imitation parameter “q”
B & W TV	0.108	0.231
Color TV	0.059	0.146
Room AC	0.006	0.185
Clothes Dryer	0.009	0.143
Ultrasound Imaging	0.0001	0.534
Cell phones	0.008	0.421
CD Player	0.055	0.378
Steam Iron	0.031	0.128
Microwave Oven	0.002	0.357
Home PC	0.121	0.281

Estimating “p” &
“q”

(2)
*Three data
points*

Three data points

$$S_t = [p + q (N_{t-1}/M)] * [M - N_{t-1}]$$

$$S_t = a + bN_{t-1} - cN_{t-1}^2$$

Solve for a,b, c

$$p = a/M$$

$$q = -Mc$$

“M”

(1)
Ask Consumers

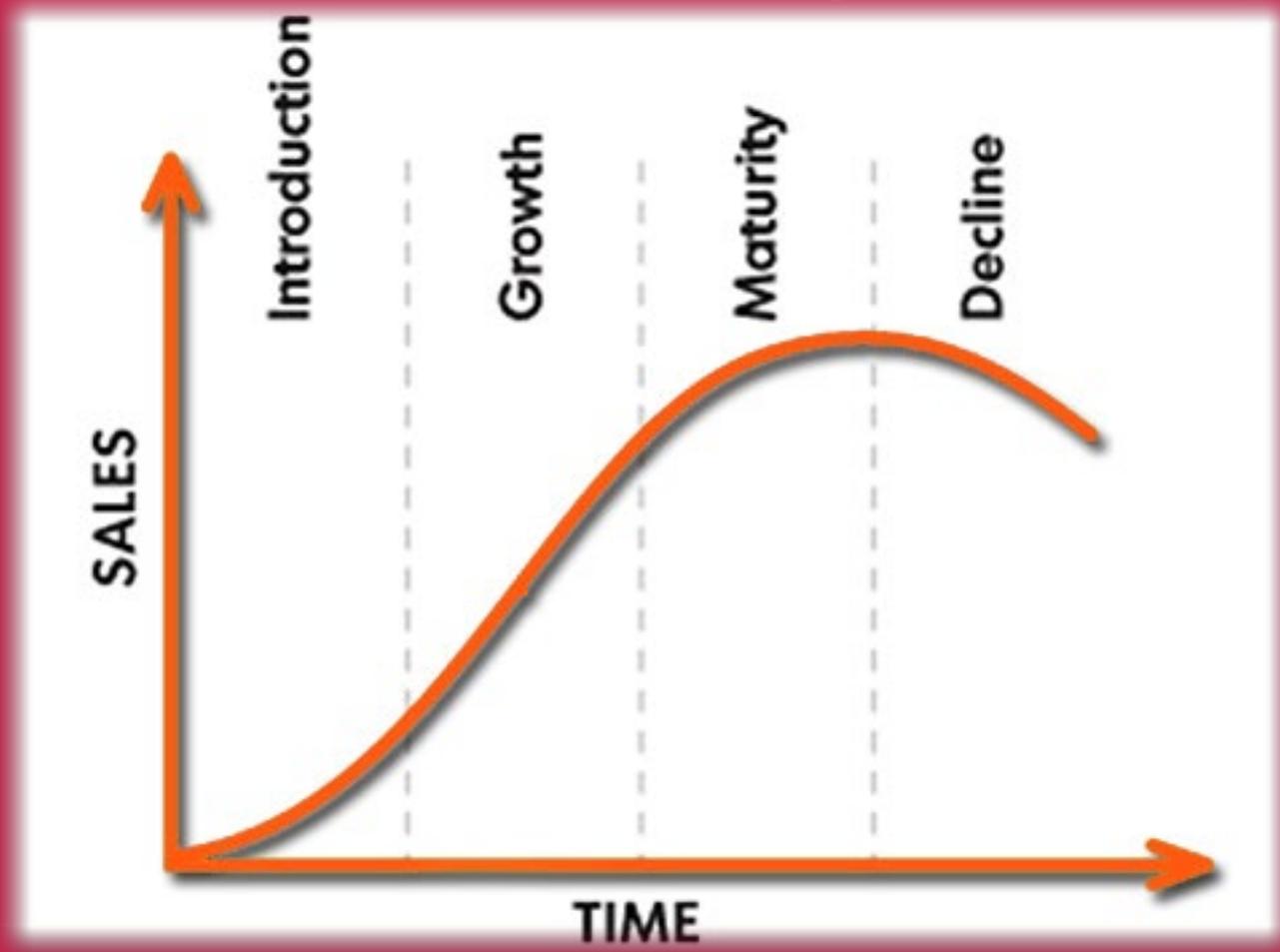
(2)
Ask Experts

“p & q”

(1)
Other products

(2)
Three data points

Product Life Cycle



Product Diffusion

“p”  Effect of Advertising
Innovation Rate

“q”  Effect of WOM
Imitation Rate

DIFFUSION RATES

An example ...



I. Market Potential

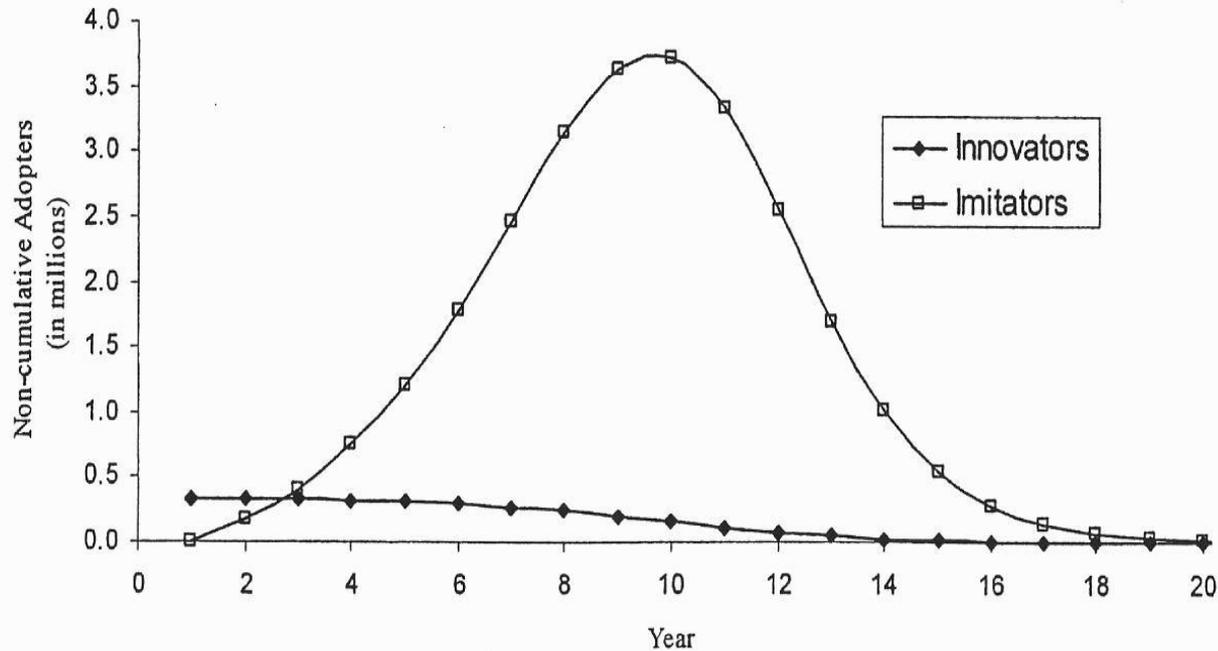
Subscription Price

Radio Price	\$12	\$10	\$8	\$5	\$2
\$400	23,682,641	27,404,662	27,484,190	27,590,767	27,714,837
\$300	24,781,778	28,526,070	28,685,126	28,898,280	29,146,420
\$250	26,552,125	30,698,835	31,225,323	31,840,895	32,637,794
\$200	31,470,304	36,515,712	37,829,543	40,490,651	42,806,598
\$150	35,626,570	580,232,54,026,74	44,098,158	49,110,119	52,965,846
\$100	45,726,942	54,026,759	58,682,464	68,262,745	77,771,435

2. Estimation of p & q

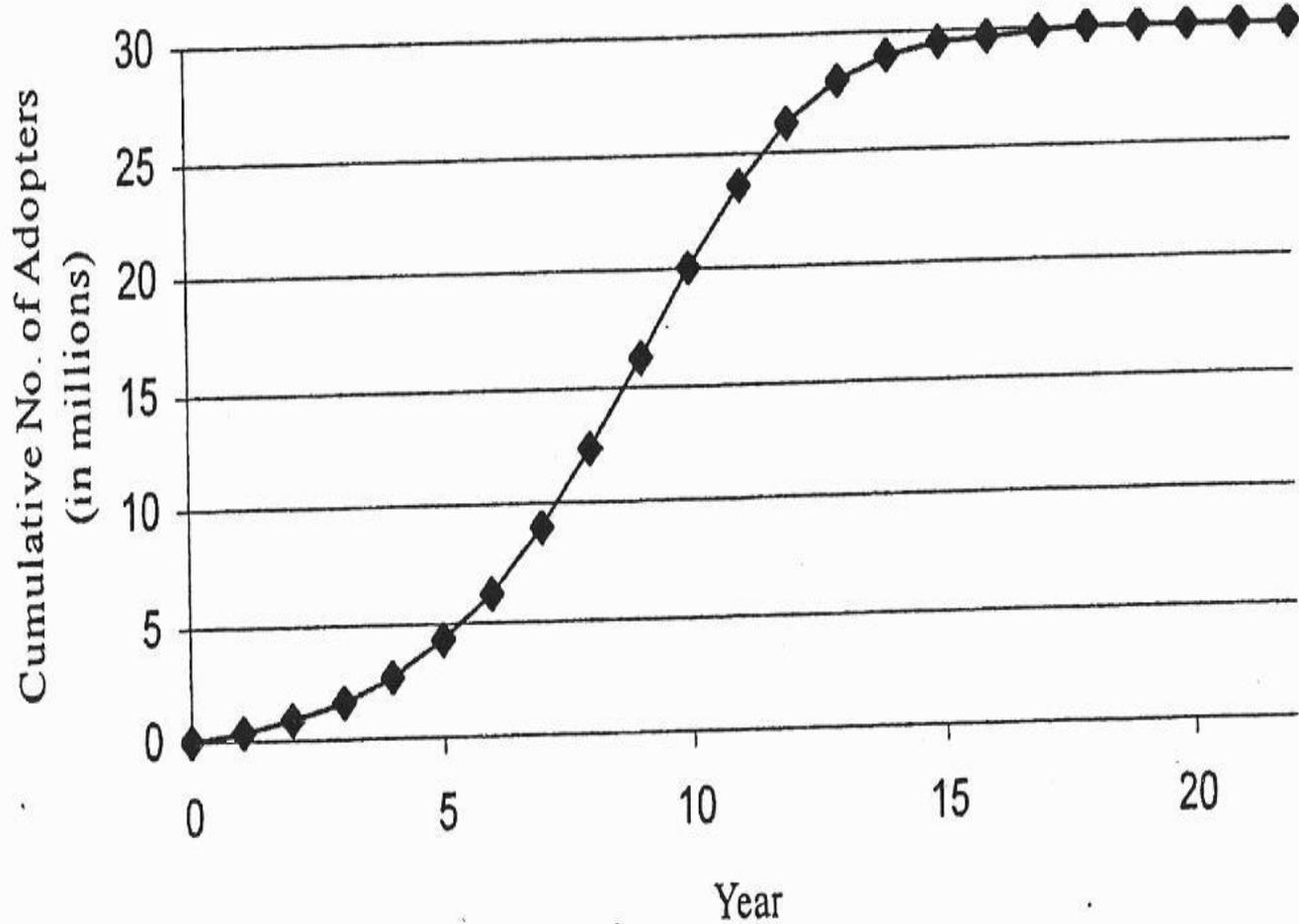
Product	p	q
Portable CD player	0.00605	0.66
Automobile radio	0.0161	0.41
Cellular phone	0.008	0.421

Effect of p and q – Satellite Radio



Source: Casewriter.

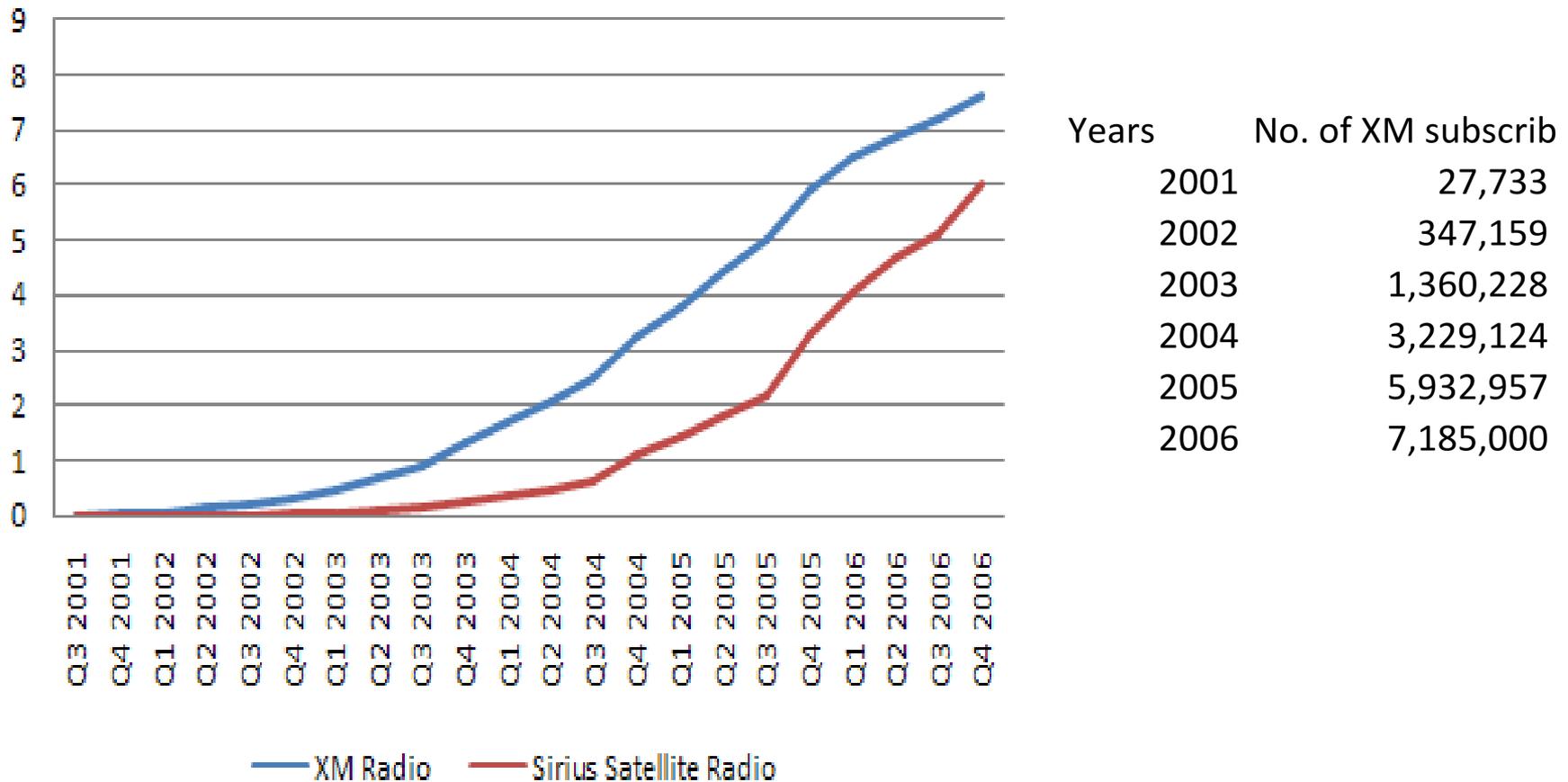
Figure E1 Demand Forecast for Satellite Radio Based on the Bass Model





Why the slow start and rapid acceleration?

Actual sales of XM & Sirius



E x t e n d i n g

the Bass Diffusion Model



Binary (consumer adopts or not)

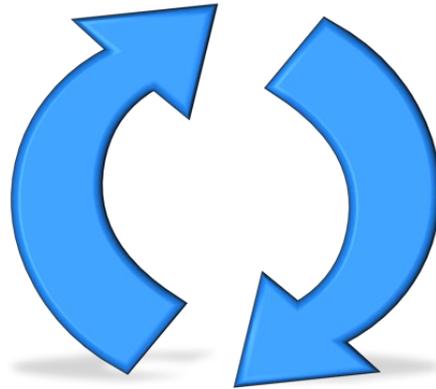
Constant potential i.e. no repeat purchase

Eventually, all will buy

WOM independent of adoption time

Independent of substitutes

No effect of marketing strategies



1. Varying market potential

2. Incorporation of marketing variables

Coefficient of innovation (p) as a function of advertising

$$p(t) = a + b * Advertising$$

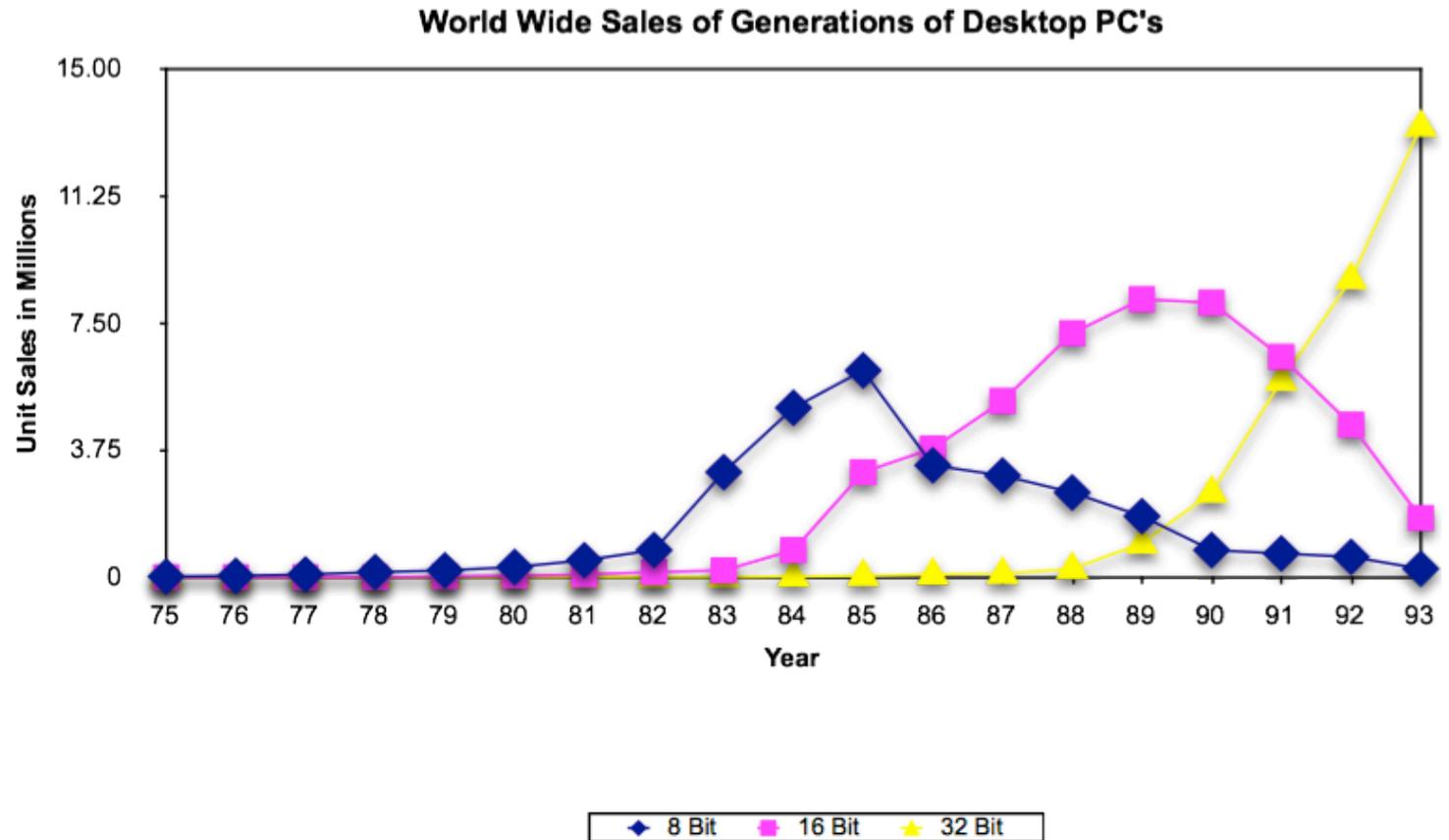
Effects of price and detailing.

3. Incorporating repeat purchases

4. Multi-stage diffusion process

Awareness □□ Interest □□ Adoption □□ Word of mouth

Generations of PC's



Rules of Diffusion Forecasting

(I) Hazy



(2) Time is of essence



(3) Garbage in, Garbage out

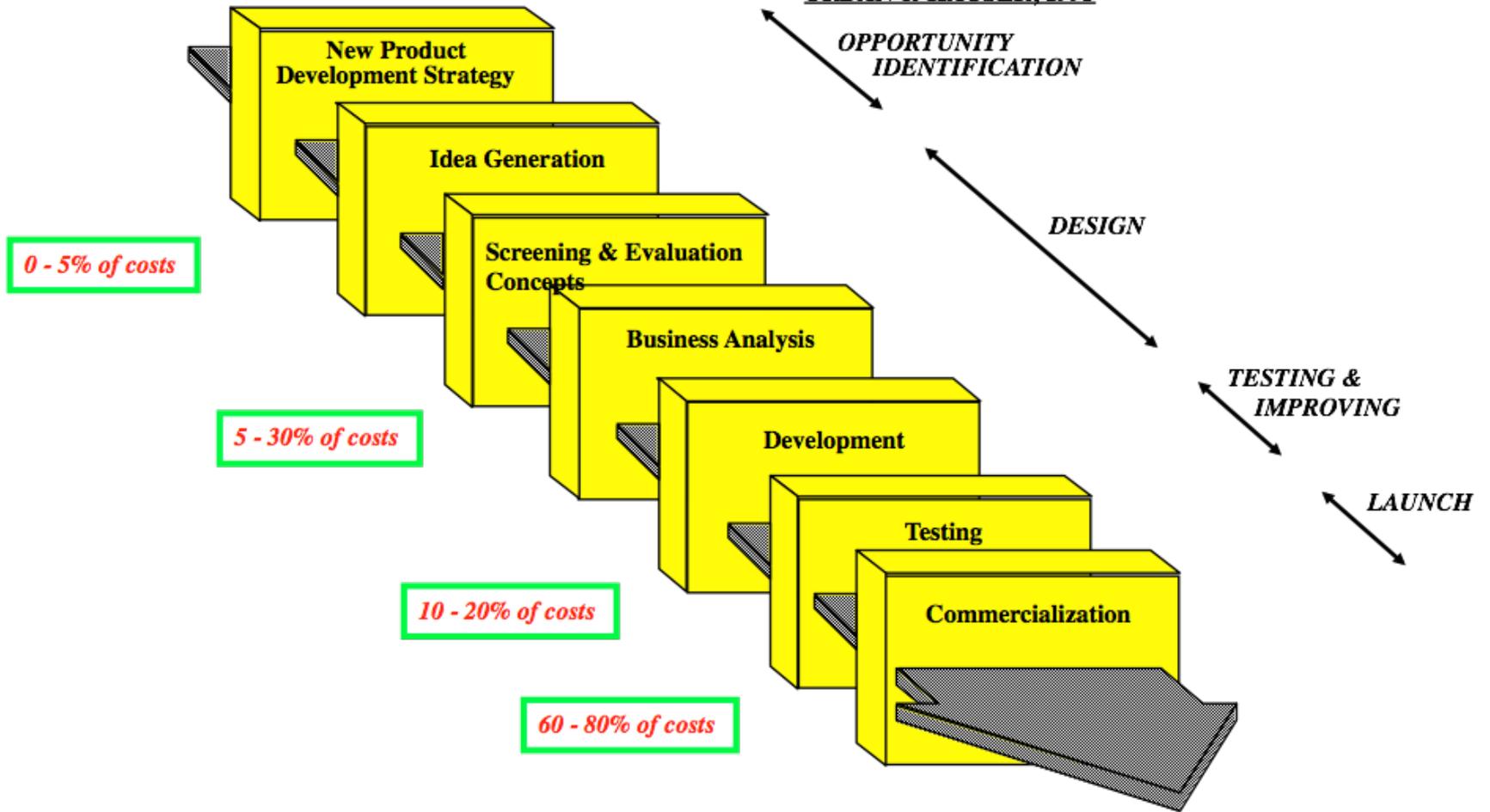


(4) “p” and “q” from other countries

Where does it fit in the
product development
process?

Booz-Allen & Hamilton, 1982

URBAN & HAUSER, 1993



Market Sizing 1

Prof Narayan Janakiraman

Forecasting - Quantitative Methods

- **Time Series Models:**

- Assumes information needed to generate a forecast is contained in a time series of data
- Assumes the future will follow same patterns as the past

- **Causal Models or Associative Models**

- Explores cause-and-effect relationships
- Uses leading indicators to predict the future
- E.g. housing starts and appliance sales

Time Series Models

Forecaster looks for data patterns as

- Data = historic pattern + random variation

Historic pattern to be forecasted:

- Level (long-term average) – data fluctuates around a constant mean
- Trend – data exhibits an increasing or decreasing pattern
- Seasonality – any pattern that regularly repeats itself and is of a constant length
- Cycle – patterns created by economic fluctuations

Random Variation cannot be predicted

Causal Models

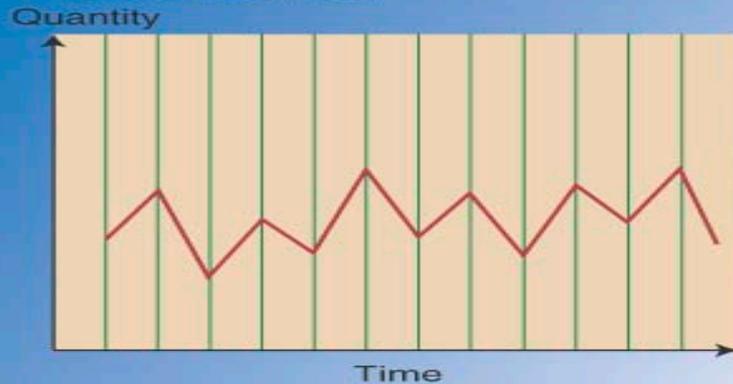
- Causal models establish a cause-and-effect relationship between dependent variable to be forecast (Y) and independent variables (x_i)
- A common tool of causal modeling is multiple linear regression:

$$Y = a + \mathbf{b}_1 x_1 + \mathbf{b}_2 x_2 + \dots + \mathbf{b}_k x_k$$

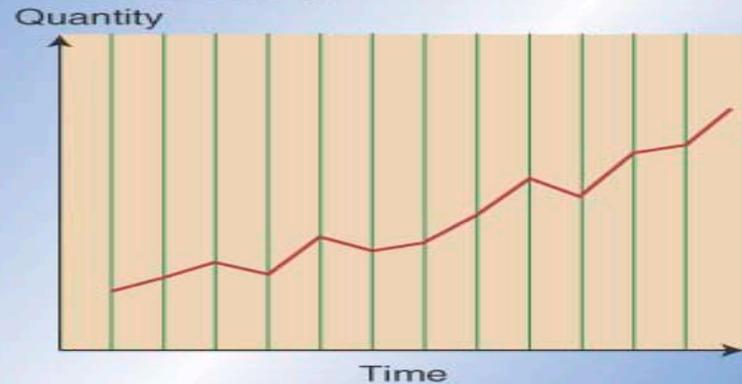
- Often, leading indicators can be included to help predict changes in future demand e.g. housing starts

Time Series Patterns

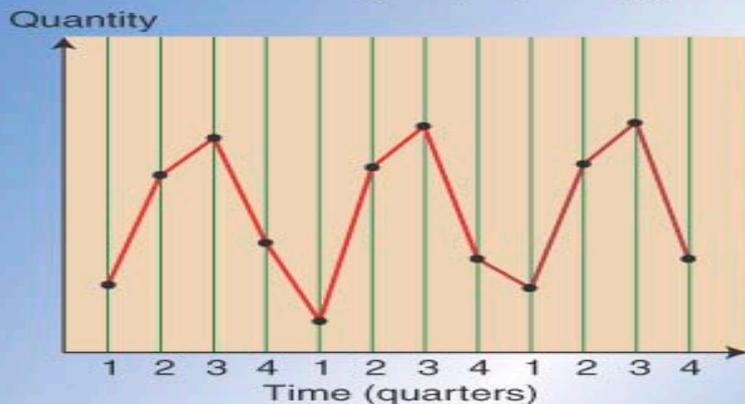
(a) Level or Horizontal Pattern:
Data follows a horizontal pattern around the mean



(b) Trend Pattern:
Data is progressively increasing (shown) or decreasing



(c) Seasonal Pattern:
Data exhibits a regularly repeating pattern



(d) Cycle:
Data increases or decreases over time



Time Series Models

- Naive: $F_{t+1} = A_t$
 - The forecast is equal to the actual value observed during the last period – good for level patterns
- Simple Mean: $F_{t+1} = \sum A_t / n$
 - The average of all available data - good for level patterns
- Moving Average: $F_{t+1} = \sum A_t / n$
 - The average value over a set time period
(e.g.: the last four weeks)
 - Each new forecast drops the oldest data point & adds a new observation
 - More responsive to a trend but still lags behind actual data

Time Series - Problem & Solution

Period	Actual	2-Period	4-Period
1	300		
2	315		
3	290		
4	345		
5	320		
6	360		
7	375	340.0	328.8
8		367.5	350.0

Time Series Model 1

Weighted Moving Average:

$$F_{t+1} = \sum C_t A_t$$

- All weights must add to 100% or 1.00
e.g. C_t .5, C_{t-1} .3, C_{t-2} .2 (weights add to 1.0)
- Allows emphasizing one period over others; above indicates more weight on recent data ($C_t=.5$)
- Differs from the simple moving average that weighs all periods equally - more responsive to trends

Time Series Problem

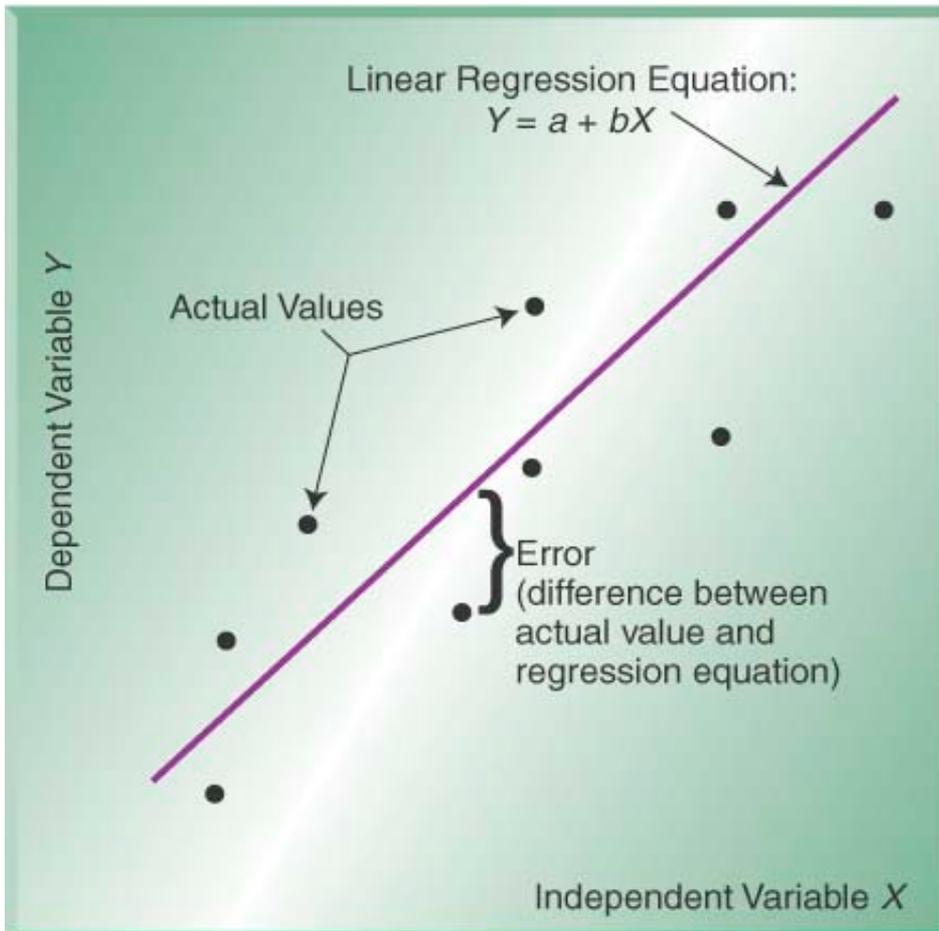
- Determine forecast for periods 7 & 8
- 2-period moving average
- 4-period moving average
- 2-period weighted moving average with t-1 weighted 0.6 and t-2 weighted 0.4
- Exponential smoothing with $\alpha=0.2$ and the period 6 forecast being 375

Period	Actual
1	300
2	315
3	290
4	345
5	320
6	360
7	375
8	

Time Series Problem Solution

Period	Actual	2-Period	4-Period	2-Per.Wgted.
1	300			
2	315			
3	290			
4	345			
5	320			
6	360	340.0	328.8	344.0
7	375	367.5	350.0	369.0
8				

Linear Regression



- Identify dependent (**y**) and independent (**x**) variables
- Solve for the slope of the line

$$b = \frac{\sum XY - n\bar{X}\bar{Y}}{\sum X^2 - n\bar{X}^2}$$

- Solve for the \bar{y} intercept
 $a = \bar{Y} - b\bar{X}$
- Develop your equation for the trend line

$$Y = a + bX$$

Linear Regression Problem: A maker of golf shirts has been tracking the relationship between sales and advertising dollars. Use linear regression to find out what sales might be if the company invested \$53,000 in advertising next year.

	Sales \$ (Y)	Adv.\$ (X)	XY	X ²	Y ²
1	130	32	4160	2304	16,900
2	151	52	7852	2704	22,801
3	150	50	7500	2500	22,500
4	158	55	8690	3025	24964
5	153.85	53			
Tot	589	189	28202	9253	87165
Avg	147.25	47.25			

$$b = \frac{\sum XY - n\bar{X}\bar{Y}}{\sum X^2 - n\bar{X}^2}$$

$$b = \frac{28202 - 4(47.25)(147.25)}{9253 - 4(47.25)^2} = 1.15$$

$$a = \bar{Y} - b\bar{X} = 147.25 - 1.15(47.25)$$

$$a = 92.9$$

$$Y = a + bX = 92.9 + 1.15X$$

$$Y = 92.9 + 1.15(53) = 153.85$$

Selecting the Right Forecasting Model

The amount & type of available data

- Some methods require more data than others

Degree of accuracy required

- Increasing accuracy means more data

Length of forecast horizon

- Different models for 3 month vs. 10 years

Presence of data patterns

- Lagging will occur when a forecasting model meant for a level pattern is applied with a trend