ISE 599
Special Topics Applied Predictive Analytics

Marketing analytics

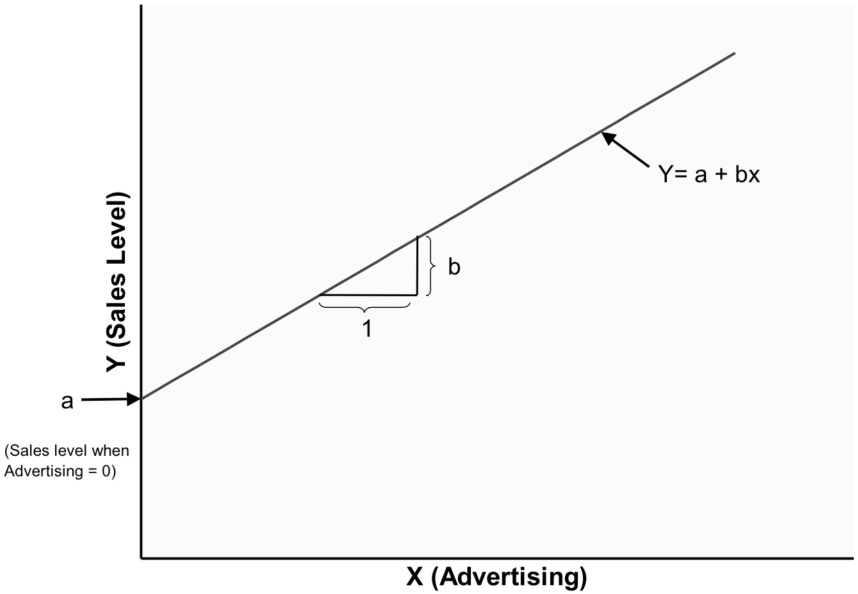
- Thus far we have been looking at the ‘technical’ side of predictive analytics
- In the real world, we must often work with departments such as marketing, operations etc. to make these predictive analytics ‘applied’
- Today we will bbe looking at a particularly potent application, and one that is becoming more prominent: marketing analytics
- Marketing analytics has several definitions, based on who you ask (try to look up some of them online, and see if you can figure out the similarities and differences!)

Today we take a more technical view of marketing analytics

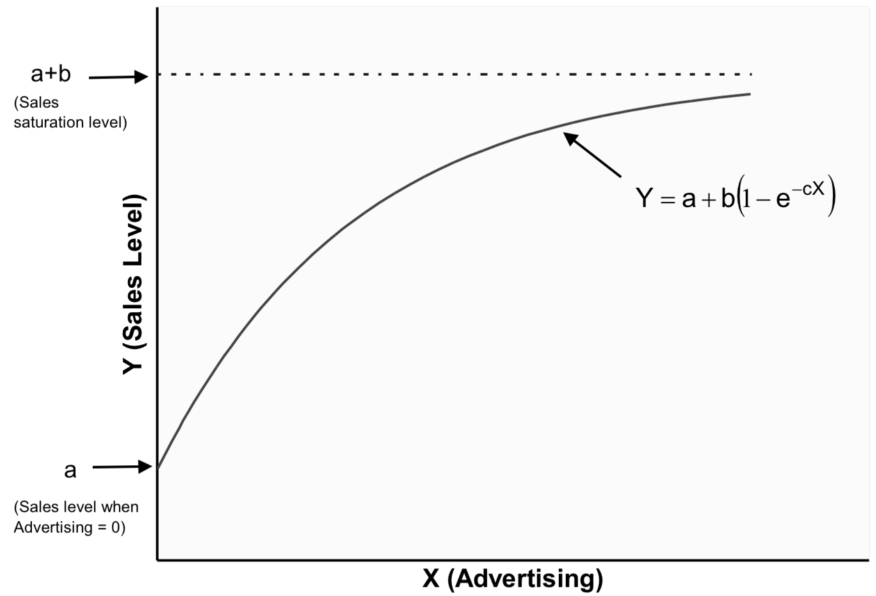
- Let's begin with market response models
- Purpose of a market response model is to relate marketing effort (inputs) to market results (outputs)
- What are some things that go into defining/influence these models?
  - Number of marketing variables included
  - Nature of relationship between input and output variables
  - Level of response: aggregate or disaggregate
  - Level of demand: sales vs. market share

Some Common Response Models

- Linear

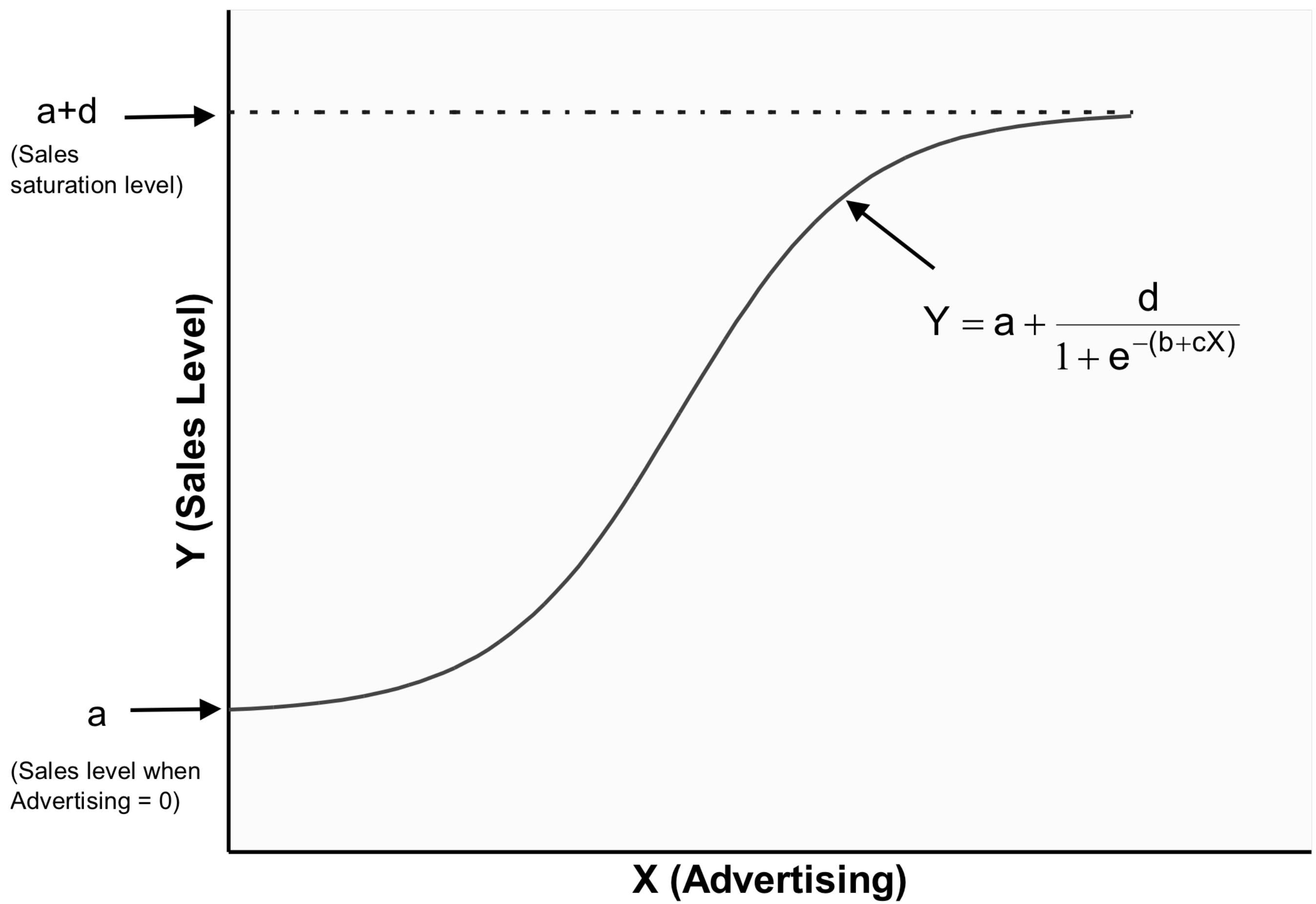


- Diminishing returns



Some Common Response Models (cont'd)

- S-Shape



How do we use market response models?

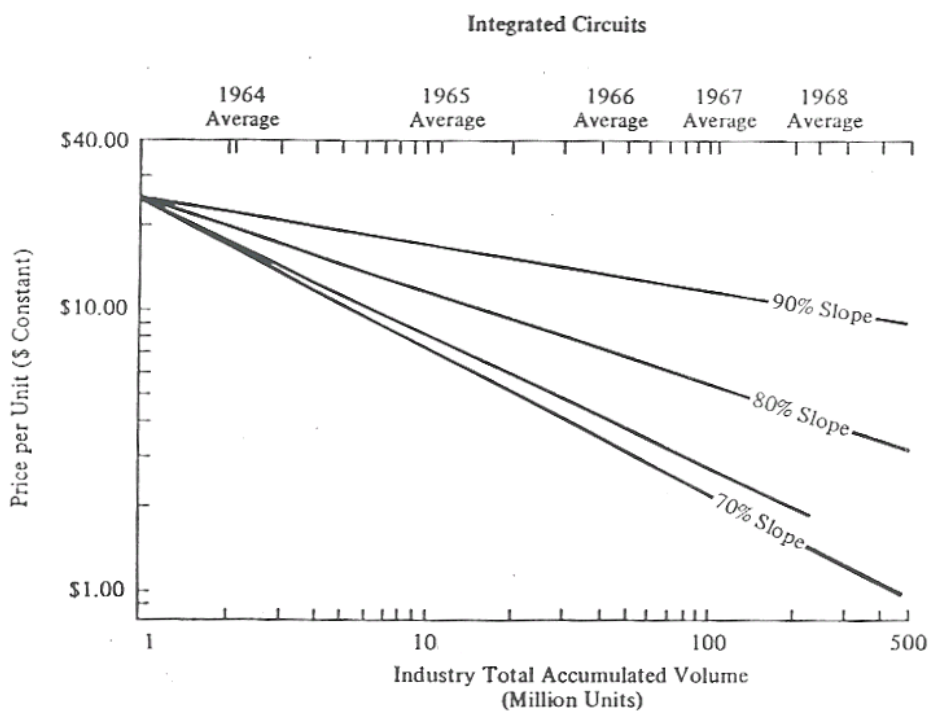
- Specify model
- Obtain/Collect data
- Calibrate parameters
- Assess model performance
- Use model to answer specific managerial questions

Tool 1: Price Experience Curve

- Verbal

  Each time *cumulative* volume of production of a product doubles, prices fall by a constant percentage.

- Graphical



Price Experience Curve

- Mathematical

$$P_t = P_1 \left(\frac{CV_t}{CV_1} \right)^b$$

where

CV_t = Cumulative production volume at the end of period *t,*

CV_1 = Cumulative production volume at the end of period 1,

P_t = Price per unit at the end of period *t*,

P_1= Price per unit at the end of period 1,

b = Learning coefficient

Determining the "Slope"

Substitute a doubling for CV_t / CV_1:

$$P_t = P_1 (2)^b$$

$$\frac{P_t}{P_1} = 2^b$$

$$\text{Slope} = 2^b$$

Estimating the "Slope"

Mathematical expression:

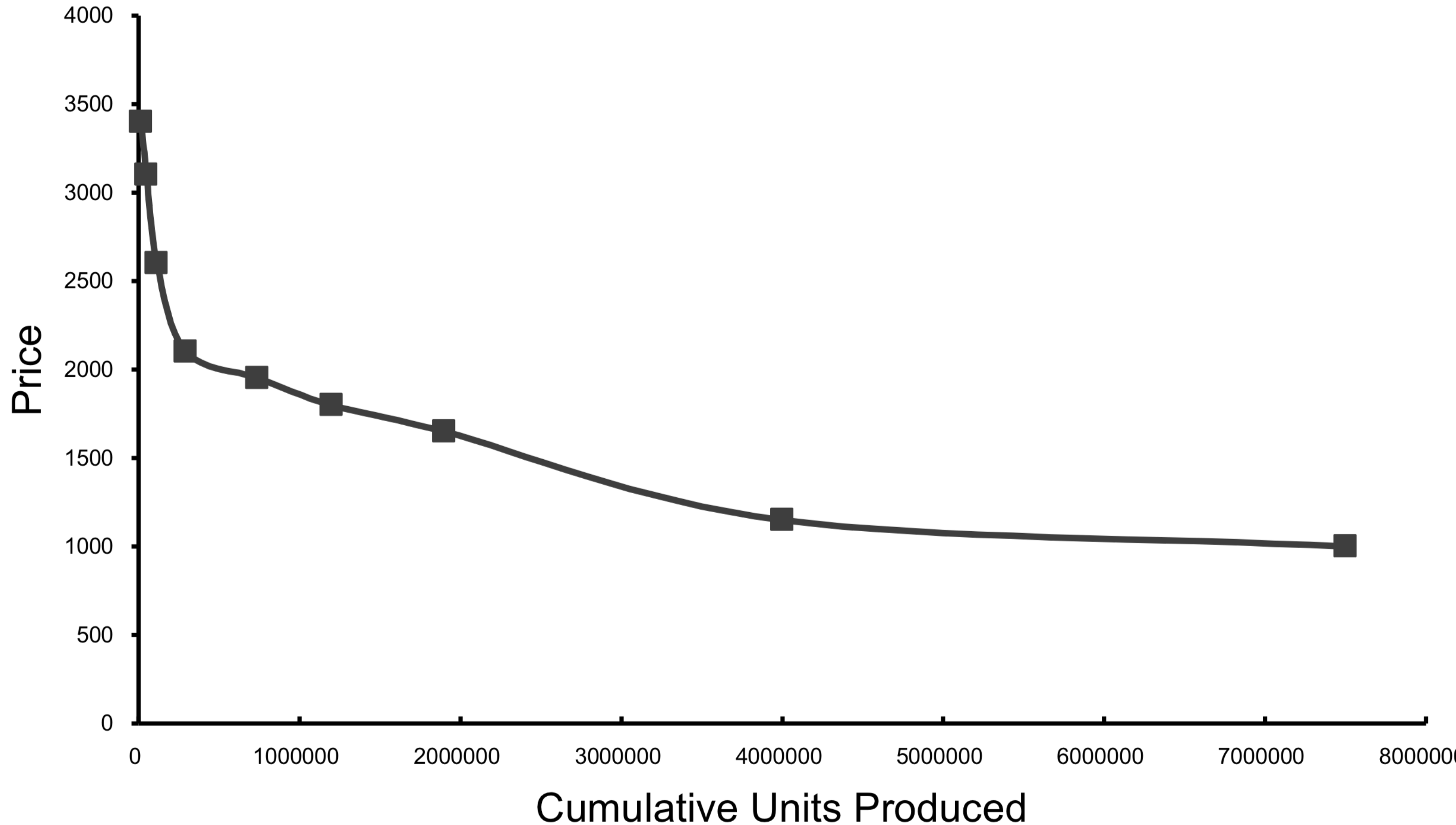
$$P_t = P_1\left(\frac{CV_t}{CV_1}\right)^b$$

How to estimate?

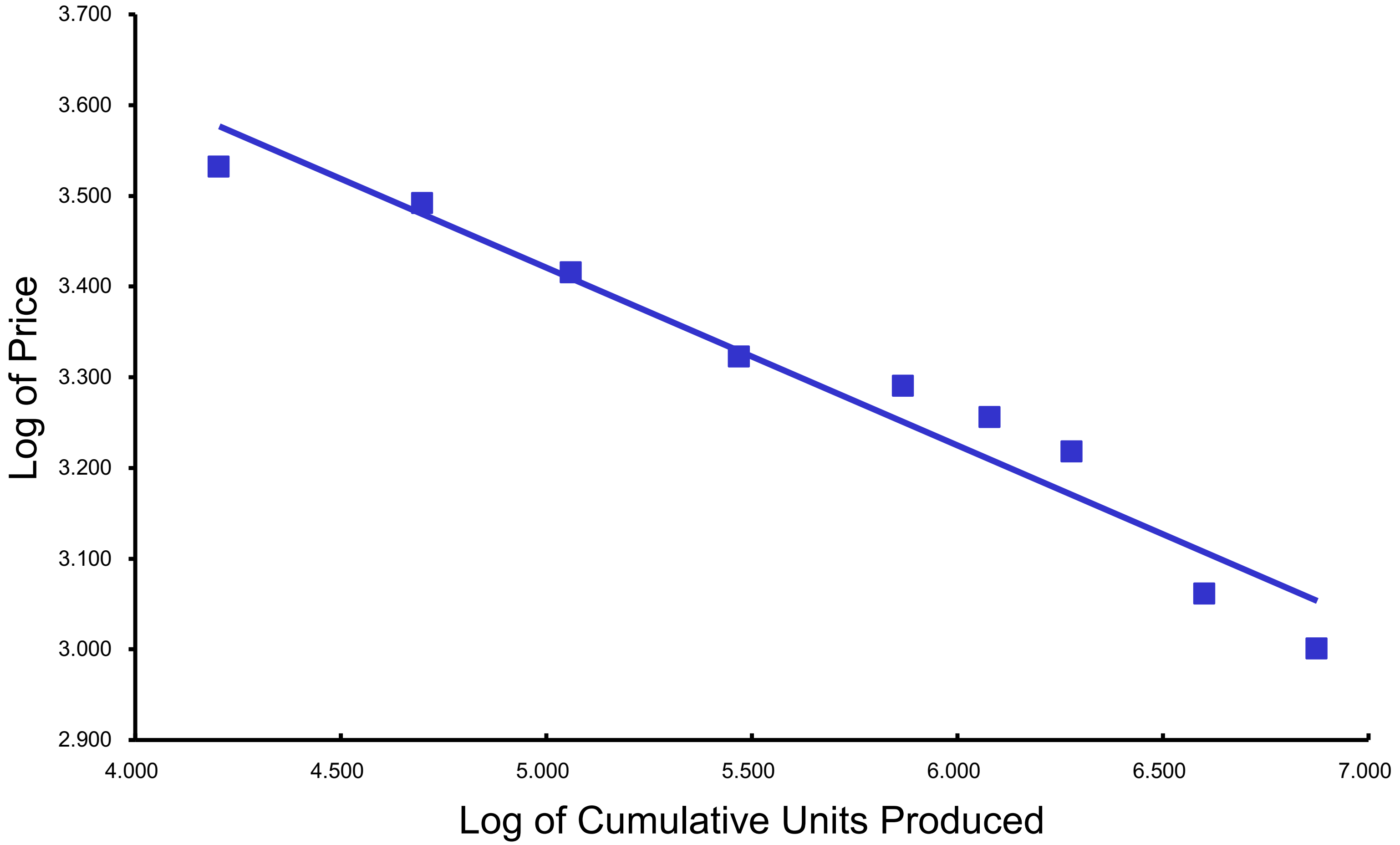
The Ford Model T

Cumulative Volume	Price	Log(CVt/CV1)	LogPrice
16000	3400		
50000	3100	0.495	3.491
115000	2600	0.857	3.415
295000	2100	1.266	3.322
740000	1950	1.665	3.290
1200000	1800	1.875	3.255
1900000	1650	2.075	3.217
4000000	1150	2.398	3.061
7500000	1000	2.671	3.000

Ford T's Experience Curve



Log - Log Graph



Regression Output

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.974972298
R Square	0.950570982
Adjusted R Square	0.942332812
Standard Error	0.039705846
Observations	8

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.181912582	0.181913	115.3861868	3.84605E-05
Residual	6	0.009459325	0.001577		
Total	7	0.191371908			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	3.613608341	0.036086691	100.1369	6.68433E-11	3.525307324	3.701909359
Log(CVt/CV1)	-0.214785552	0.019995311	-10.7418	3.84605E-05	-0.26371235	-0.165858754

$$\text{Slope} = 2^{-0.21478552} = 86.17\%$$

Question: How do we forecast **without** data (i.e. for **new** products)?