

Understanding Prediction

- **Prediction:** statement of what is believed will happen in the future made on the basis of past experience or prior observation.
- **Two approaches to prediction:**
 - 1-Extrapolation:** detects a pattern in the past and projects it into the future
 - 2-Predictive model:** uses relationships among variables to make a prediction

How to determine the Goodness of your Prediction

1-All predictions should be judged as to their “goodness” (accuracy).

2-The goodness of a prediction is based on examination of the residuals (errors: comparisons of predictions to actual values).

Bivariate Linear Relationships and Regression Analysis

- Regression analysis is a predictive analysis technique in which one or more variables are used to predict the level of another by use of the straight-line formula, $y=a+bx$.
- Bivariate regression analysis is a type of regression in which only two variables are used in the regression, predictive model.

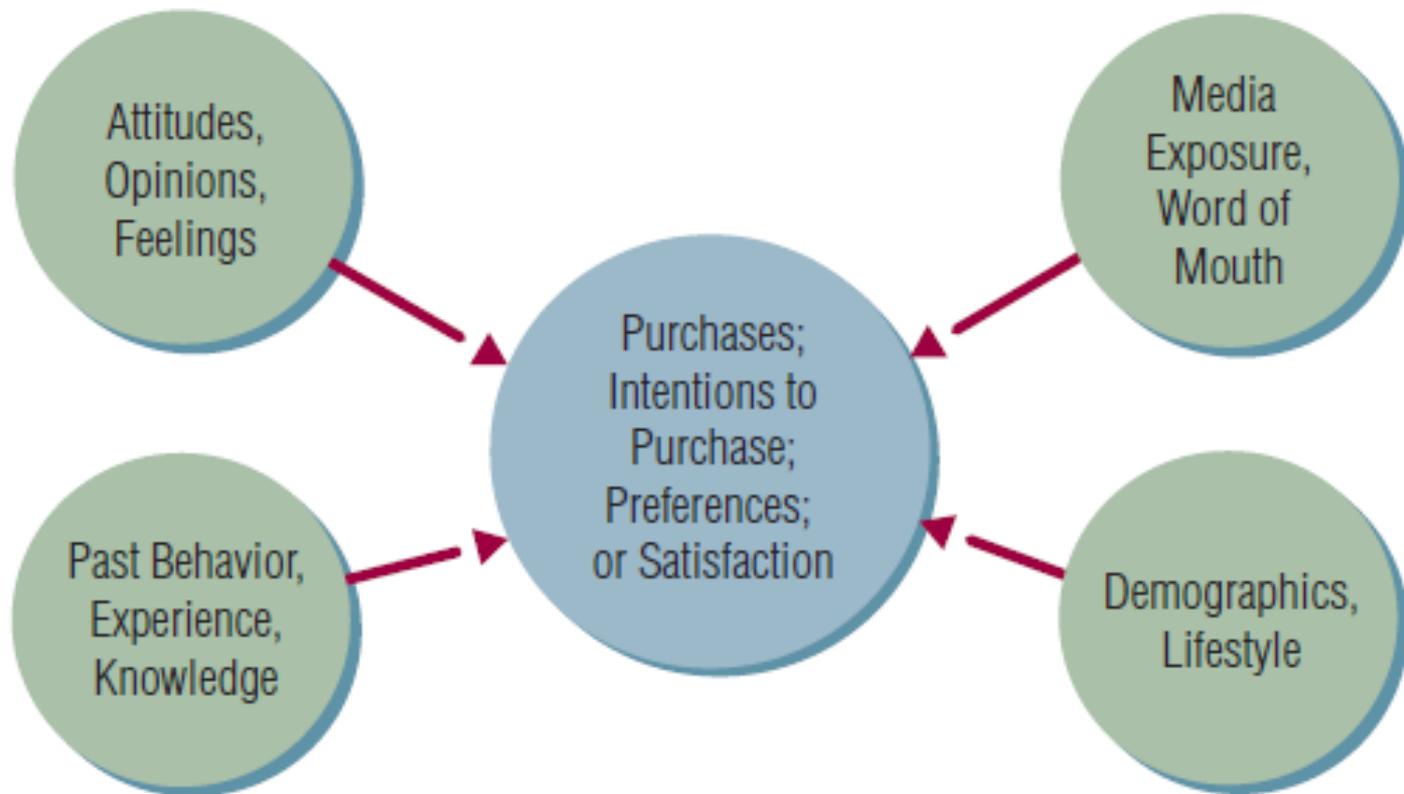
- One variable is termed the dependent variable (y), the other is termed the independent variable (x).
- The independent variable is used to predict the dependent variable, and it is the x in the regression formula.
- With bivariate analysis, one variable is used to predict another variable.

- **Dependent variable:** that which is predicted (y in the regression straight-line equation)

Multiple Regression Analysis

- Multiple regression analysis uses the same concepts as bivariate regression analysis, but uses more than one independent variable.
- General conceptual model identifies independent and dependent variables and shows their basic relationships to one another.

Multiple Regression Analysis: A Conceptual Model



- Multiple regression means that you have more than one independent variable to predict a single dependent variable.

Multiple Regression Equation $y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_mx_m$

where

y = the dependent, or predicted, variable

x_i = independent variable i

a = the intercept

b_i = the slope for independent variable i

m = the number of independent variables in the equation.

Example of Multiple Regression

- We wish to predict customers' intentions to purchase a Lexus automobile.
- We performed a survey that included an attitude-toward-Lexus variable, a word-of-mouth variable, and an income variable.

Example of Multiple Regression

- Here is the result:

Lexus Purchase Intention Multiple Regression Equation Example

$$\begin{aligned} \text{Intention to purchase a Lexus} &= 2 \\ &+ 1.0 \times \text{attitude toward Lexus (1-5 scale)} \\ &- .5 \times \text{attitude toward current auto (1-5 scale)} \\ &+ 1.0 \times \text{income level (1-10 scale)} \end{aligned}$$

Warnings Regarding Multiple Regression Analysis

- 1-Regression is a statistical tool, not a cause-and-effect statement.
- 2-Regression analysis should not be applied outside the boundaries of data used to develop the regression model.