# **Choice Models Overview SCM 600 Business Analytics Choice Models**

# **Choice Models**

• Choice models examine binary behavior or choices.

- Choice models examine binary behavior or choices.
  - E.g., a customer walks into a store and either buys a TV or doesn't.

### **Choice Models**

- Choice models examine binary behavior or choices.
  - E.g., a customer walks into a store and either buys a TV or doesn't.
  - The Y variable is not a continuous number but is binary (i.e., zero or one).

- Choice models examine binary behavior or choices.
  - E.g., a customer walks into a store and either buys a TV or doesn't.
  - The Y variable is not a continuous number but is binary (i.e., zero or one).
- Choice models apply to:

### **Choice Models**

- Choice models examine binary behavior or choices.
  - E.g., a customer walks into a store and either buys a TV or doesn't.
  - The Y variable is not a continuous number but is binary (i.e., zero or one).
- Choice models apply to:
  - Purchases

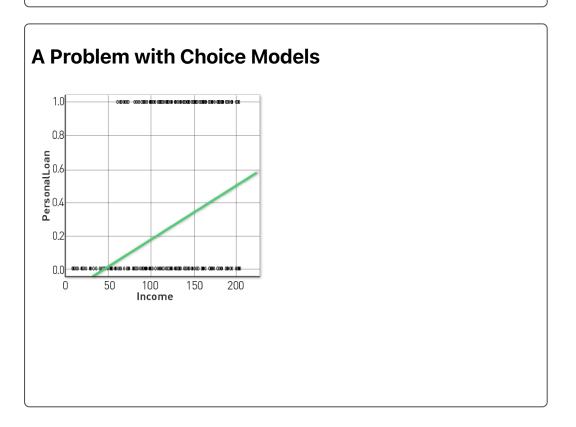
- Choice models examine binary behavior or choices.
  - E.g., a customer walks into a store and either buys a TV or doesn't.
  - The Y variable is not a continuous number but is binary (i.e., zero or one).
- Choice models apply to:
  - Purchases
  - Elections of government candidates

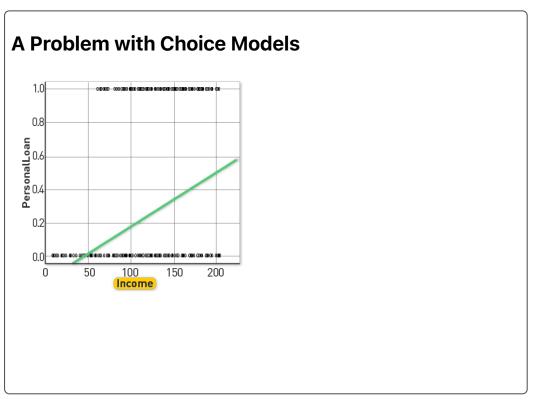
### **Choice Models**

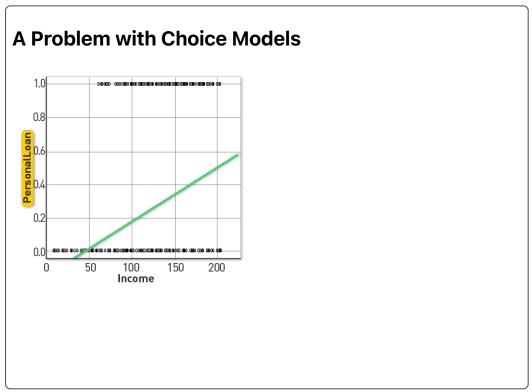
- Choice models examine binary behavior or choices.
  - E.g., a customer walks into a store and either buys a TV or doesn't.
  - The Y variable is not a continuous number but is binary (i.e., zero or one).
- Choice models apply to:
  - Purchases
  - Elections of government candidates
  - Loan and credit approvals

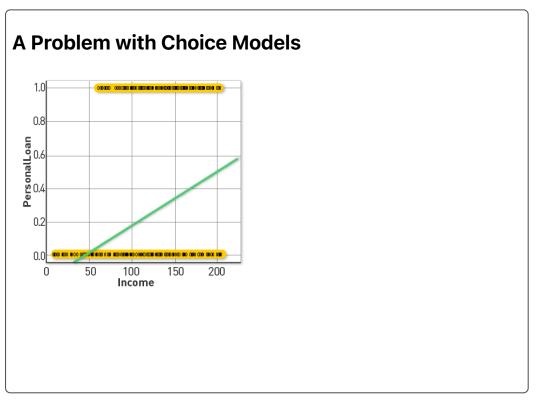
- Choice models examine binary behavior or choices.
  - E.g., a customer walks into a store and either buys a TV or doesn't.
  - The Y variable is not a continuous number but is binary (i.e., zero or one).
- Choice models apply to:
  - Purchases
  - Elections of government candidates
  - Loan and credit approvals
  - Anything where there is a choice of yes or no, zero or one.

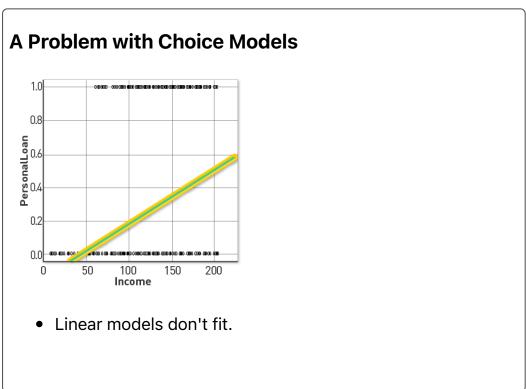




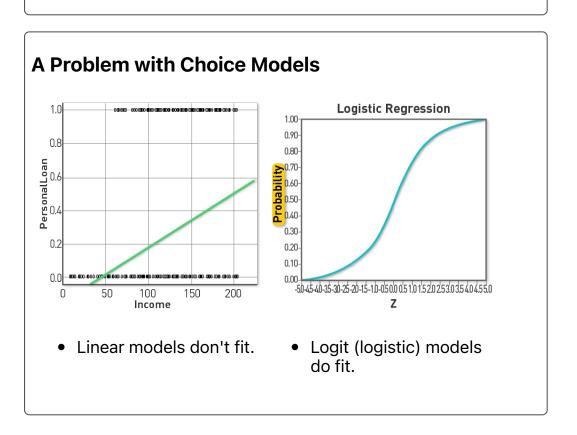


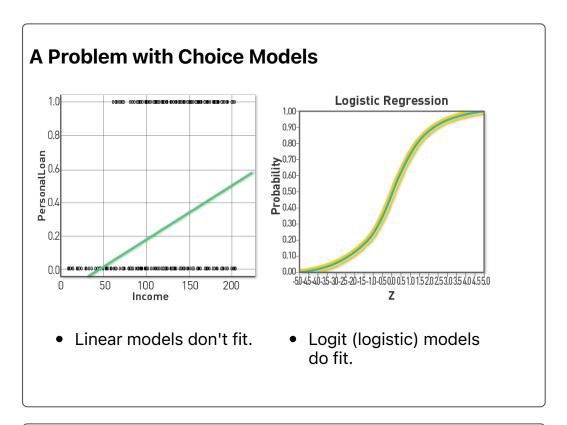






### **A Problem with Choice Models Logistic Regression** 1.00-0.90-0.8 0.80-PersonalLoan 5.0 Probability 0.50-0.40-0.30 0.2 0.20-0.10--50-45-40-35-30-25-20-15-1.D-0'50.D 0'.5 1.D 1'.5 2.D 2'.5 3.D 3.5 4.D 4.5 5.D 50 100 150 200 Income • Logit (logistic) models • Linear models don't fit. do fit.





# **Logistic Regression and Logit**

# **Logistic Regression and Logit**

• Logistic regression assumes that the Y variable is a probability, ranging from zero to one.

# **Logistic Regression and Logit**

- Logistic regression assumes that the Y variable is a probability, ranging from zero to one.
- The regression determines the likelihood that someone will make a purchase, vote for a candidate, etc.

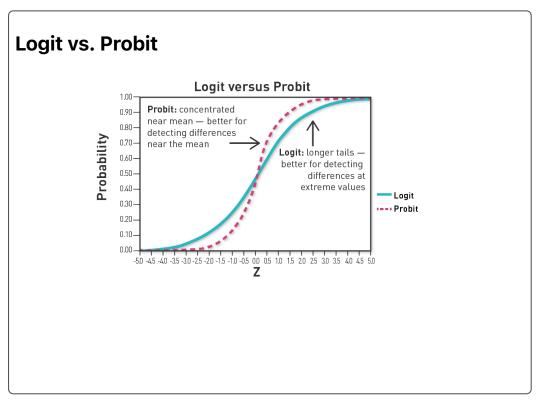
# **Logistic Regression and Logit**

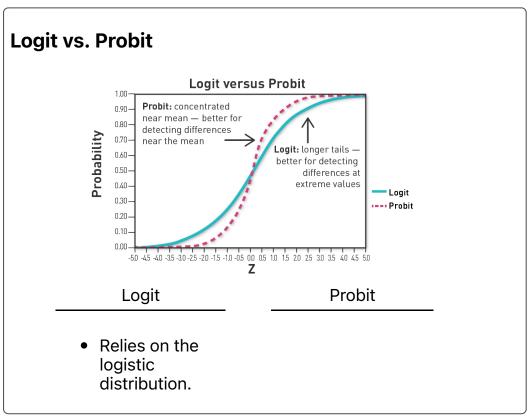
• Logistic regression assumes that the Y variable is a probability, ranging from zero to one.

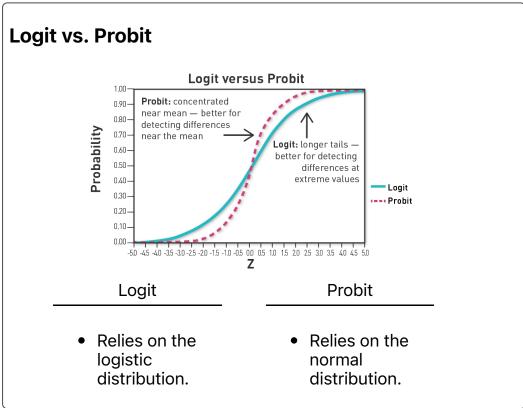
- The regression determines the likelihood that someone will make a purchase, vote for a candidate, etc.
- It relies on the logistic function:

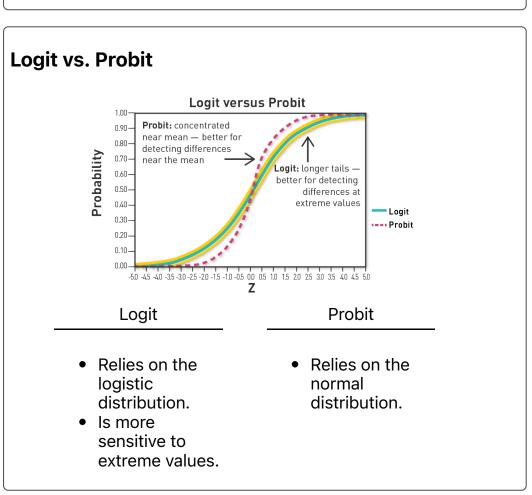
$$P(Y = 1) = \exp(\sum \beta_i X_i) / [1 + \exp(\sum \beta_i X_i)]$$

Logit vs. Probit			









# **Logit vs. Probit**

### Logit versus Probit Probit: concentrated 0.90- $\mathsf{near}\,\mathsf{mean}-\mathsf{better}\,\mathsf{for}$ 0.80detecting differences Probability 0.70near the mean Logit: longer tails -0.60better for detecting 0.50differences at extreme values 0.40 - Logit 0.30 ·--· Probit 0.20 -50 -45 -40 -35 -30 -25 -20 -15 -10 -05 00 05 10 15 20 25 30 35 40 45 50 **Z**

Relies on the logistic distribution.

Logit

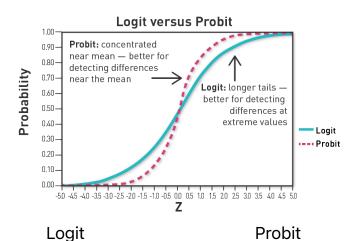
 Is more sensitive to extreme values.  Relies on the normal

**Probit** 

 Is more sensitive to values near the mean.

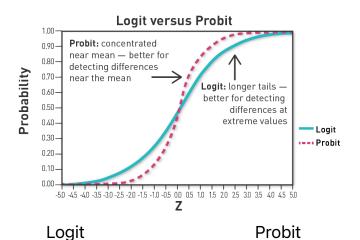
distribution.

# **Logit vs. Probit**



- Relies on the logistic distribution.
- Is more sensitive to extreme values.
- Relies on the normal distribution.
- Is more sensitive to values near the mean.
- Logit and probit usually produce similar results.

# **Logit vs. Probit**



- Relies on the logistic distribution.
- Is more sensitive to extreme values.
- Relies on the normal distribution.
- Is more sensitive to values near the mean.
- Logit and probit usually produce similar results.