

Obtaining probabilities from the Logistic regression model

- $\ln\left(\frac{P(Y=1)}{1-P(Y=1)}\right) = Z$ (- Equation 1)

- Odds from eq 1

- $\frac{P(Y=1)}{1-P} = e^Z$ - Equation 2

- Obtaining Probability from eq 2

$$P(Y = 1) = \frac{e^Z}{1 + e^Z}$$

$$P(Y = 1) = \frac{1}{1 + e^{-Z}}$$

- $Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m$

- X_1, X_2, \dots, X_m are the independent variables

Example1 $\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x$

- Y = personal loan =Yes or No (1/0)
- X1= Member -> Yes / No (1/0)
- X2=Age
- X3 =VEHICLE LOAN =YES OR NO

- $\beta_0 = -3.911$
- $\beta_1 = 0.652$
- $\beta_2 = 0.029$
- $\beta_3 = 0.342$

- Member=1
- Age=40
- Vehicle Loan =0

- $P(Y = 1) = \frac{1}{1 + e^{-Z}}$

- $Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m$

- $P(x) = \frac{1}{1 + e^{(-3.911 + 0.652 \cdot 1 + 0.029 \cdot 40 + 0.342 \cdot 0)}} = 0.11$

- The probability of not choosing a loan
 - 1-p

Example2 $\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x$

- Y = personal loan =Yes or No (1/0)
- X1= Member -> Yes / No (1/0)
- X2=Age
- X3 =VEHICLE LOAN =YES OR NO

- $\beta_0 = -3.911$
- $\beta_1 = 0.652$
- $\beta_2 = 0.029$
- $\beta_3 = 0.342$

- Member=0
- Age=40
- Vehicle Loan =0

- $P(Y = 1) = \frac{1}{1 + e^{-Z}}$

- $Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m$

- $P(x) = \frac{1}{1 + e^{(-3.911 + 0.652 \cdot 0 + 0.029 \cdot 40 + 0.342 \cdot 0)}} = 0.06$

- The probability of not choosing a loan
 - 1-p