$$y_i = \begin{cases} 1 & \pi_i \\ 0 & 1-\pi_i \end{cases}$$

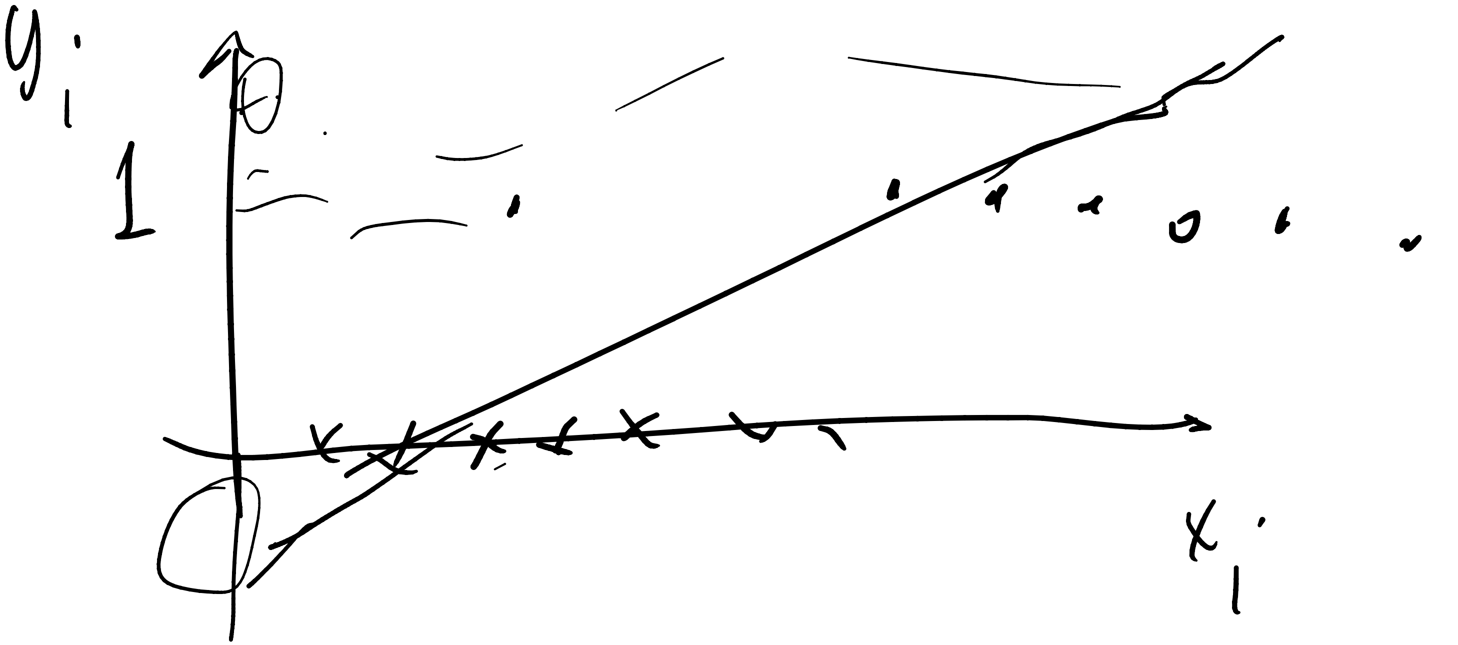
$$\underset{1\times k}{x_i'}\,\underset{k\times 1}{b} \quad y_i = x_i' b + \varepsilon_i \rightarrow \varepsilon_i = y_i - x_i' b \begin{cases} \rightarrow 1 - x_i' b & \pi_i \\ \rightarrow 0 - x_i' b & (1-\pi_i) \end{cases}$$

$$E(\varepsilon_i) = 0 \Rightarrow (1 - x_i' b)\pi_i + (-x_i' b)(1-\pi_i) \Rightarrow$$

$$\Rightarrow \pi_i = x_i' b$$

$$V(\varepsilon_i) = \pi_i(1-\pi_i) = x_i' b (1 - x_i' b) \Rightarrow \text{HETERO}$$

$\Rightarrow$ ROBUST WHITE ESTIMATION



$\tilde{\pi}_i$ είτε ≥ 1 για x_i ΜΕΓΑΛΑ

OR < 0 για x_i ΜΙΚΡΑ

y_i^* latent variable (UNOBSERVED) PROBIT

$$y_i^* = x_i' b + \varepsilon_i \qquad \varepsilon_i \sim N(0, \sigma^2)$$

$$y_i = \begin{cases} 1 & y_i^* > 0 \\ 0 & y_i^* \leq 0 \end{cases}$$

$$P(y_i = 1) = P(y_i^* > 0) \Rightarrow P(x_i' b + \varepsilon_i > 0)$$

$$\Rightarrow P(\varepsilon_i > -x_i' b) = P\left(\frac{\varepsilon_i}{\sigma} > -x_i' b/\sigma\right)$$

$$P(y_i = 1) = P\left(\frac{\varepsilon_i}{\sigma} > -\frac{x_i' \beta}{\sigma}\right) \quad (\sigma = 1)$$

$$= P(\varepsilon_i > -x_i' \beta) = P(\varepsilon_i < x_i' \beta)$$

$$= \Phi(x_i' \beta)$$

$$P(y_i = 0) = P(y_i^* < 0) = 1 - \Phi(x_i' \beta)$$

$$\ell = \sum_{i=1}^{n} \left\{ y_i \ln\left[\Phi(x_i' b)\right] + (1-y_i)\ln\left[1-\Phi(x_i' b)\right] \right\} \leq 0$$

$$b = \begin{pmatrix} b_1 \\ b_2 \\ \vdots \\ b_k \end{pmatrix} \leftarrow \text{σταθερά}$$

$$LR = 2\left[\ell(b_1, b_2, \ldots, b_k) - \ell(b_1, 0, 0, 0 \ldots 0)\right] \overset{A}{\sim} \chi^2_{k-1}$$

$$P(y_i = 1) = \Lambda(x_i'\beta) \overset{\text{LOGIT}}{=} \frac{e^{x_i'\beta}}{1+e^{x_i'\beta}} \leftarrow$$

$$y_i = \Lambda(x_i'\beta) + \varepsilon_i \qquad \varepsilon_i \sim \text{extreme value distribution}$$

$$E(y_i) = F(x_i'\beta) \rightarrow \Phi(x_i'\beta) \quad \text{PROBIT}$$

$$\rightarrow \Lambda(x_i'\beta) \quad \text{LOGIT}$$

$$\frac{\partial E(y_i)}{\partial x_v} = \phi(x_i'\beta)\,\beta_v \qquad v = 1, 2, \ldots K$$

$$\frac{\partial E(y_i)}{\partial x_v} = \frac{\exp(x_i'\beta)}{[1+\exp(x_i'\beta)]^2}\,\beta_v$$

LINEAR MODEL

$$\frac{\partial E(y_i)}{\partial x_v} = b_v \leftarrow$$

likelihood value
μόνο με σταθερά

R^2 difficult to interpret.

$$y_i = \begin{cases} 1 \\ 0 \end{cases}$$

MacFadden $R^2 = R^2_M$

$$R^2_M = 1 - \frac{l(\hat{b})}{l(\hat{b}_1, 0, 0, 0, \dots)}$$

likelihood value of the model