$$P_{i,t} = \frac{AEI_{i,t}}{A_{ag,i}}$$

$$\log\left(\frac{P_{i,t}}{1-P_{i,t}}\right) = \beta_0 + \beta_{PW}PW + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \cdots + \beta_k X_{k,i,t} + b_{0,i} + b_{PW,i}PW + \epsilon_{i,t}$$

$$\hat{P}_{i,t}$$

$$A_{irr} = \hat{P}_{i,t} A_{ag,i} \frac{AAI_i}{AEI_i}$$

$$\Delta A_{irr,i} = A_{irr,i,targetyear} - A_{irr,i,baselineyear}$$

$$AAE_{l,i} = AEI_{l,i} - AAI_{l,i}$$

$$ICU = PET - AET$$

$$U_{ag} = IWW = \frac{IWR}{WRR}$$

$$\begin{aligned} IWR &= ICU \times A_{irr} + 0.2 \times A_{rice} \\ &= C_{ag} + 0.2 \times A_{rice} \end{aligned}$$

$$U_{ind,i,t} = \beta_0 + \beta_{YEAR}YEAR + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \cdots + \beta_k X_{k,i,t} + b_{0,i} + b_{YEAR,i}YEAR + \epsilon_{i,t}$$

$$b_{YEAR,i} = \begin{cases} b_{YEAR,80} & \text{if } b_{YEAR,i} \geq b_{YEAR,80} \\ b_{YEAR,i} & \text{if } |b_{YEAR,i}| > b_{YEAR,80} \\ -b_{YEAR,80} & \text{if } b_{YEAR,i} \leq -b_{YEAR,80} \end{cases}$$

$$U_{ind,p} = U_{ind,i} \frac{GDP_p}{\sum_{p \in i} GDP_p}$$

$$\bar{x} = \frac{1}{n} \sum_{i}^{n} \left(\frac{1}{m_i} \sum_{j}^{m_i} x_{i,j} \right)$$

$$cv = \frac{1}{\bar{x}} \sqrt{\frac{\sum 1/m_i (x_{i,j} - \bar{x})^2}{\sum 1/m_i}}$$

$$WS_t = \frac{Ut_t}{Ba_{[t-10:t+10]}}$$

$$E_{m,b} = \frac{X_{m,b} - X_{o,b}}{x_{o,b}}$$