Q1.

$$\begin{cases} Q^d = \alpha_0 + \alpha_1 P + \alpha_2 S + \varepsilon \\ Q^s = \beta_0 + \beta_1 P + \beta_2 R + u \end{cases}$$

$\alpha_3 = 0$

	Q	P	1	S	R	
1	~~1~~	~~α_1~~	~~α_0~~	~~α_2~~	~~0~~	id.
2	1	β_1	β_0	0	$\boxed{\beta_2}$	id.

$$\text{rank}(\beta_2) = 1 = \underset{\overset{\shortparallel}{2}}{g} - 1 = 1$$

Problem 1

Consider an example of a system (a simplified version of the accelerator multiplier model) in which there are linear constraints of the non-excluding conditions:

end. ex.

$$\begin{cases} C_t = a_0 + a_1 Y_t + a_2 C_{t-1} + u_{t1} \\ I_t = b_0 + b_1 \left(Y_t - Y_{t-1}\right) + u_{t2} \\ Y_t = C_t + I_t, \end{cases}$$

pre-defined

$Y_t - C_t$ end. ex.

where C_t is consumption;
I_t - investments;
Y_t - income.

$$\begin{cases} C_t - \alpha_1 Y_t = \alpha_0 + \alpha_2 C_{t-1} + u_{t1} \\ -C_t + (1-b_1) Y_t = b_0 - b_1 Y_{t-1} + u_{t2} \end{cases}$$

$$A = \begin{bmatrix} \Gamma \\ \hline B \end{bmatrix}$$

$$A = \begin{array}{c} \begin{array}{cc} C_t & I_t \end{array} \\ \begin{pmatrix} 1 & -1 \\ -\alpha_1 & 1-b_1 \\ \hline \alpha_0 & b_0 \\ \alpha_2 & 0 \\ 0 & -b_1 \end{pmatrix} \end{array}$$

1) $\alpha_{51} = 0$

2) $\alpha_{42} = 0$

$\alpha_{12} + \alpha_{22} = \alpha_{52}$

$$\begin{cases} \alpha_{51} = 0 \\ \Phi_1 \alpha_1 = 0 \end{cases} \Rightarrow \Phi_1 = (0, 0, 0, 0, 1)$$

$$\operatorname{rank}(\Phi, A) = \operatorname{rank}(\Phi_1 A_1) =$$

$$(0, 0, 0, 0, 1) \begin{pmatrix} -1 \\ 1-b_1 \\ b_0 \\ 0 \\ -b_1 \end{pmatrix} = \operatorname{rank}(-b_1) = 1$$

$$\| $$

$$g - 1 = 1$$

1) identified (exactly)

$$\begin{cases} \alpha_{42} = 0 \\ \alpha_{12} + \alpha_{22} - \alpha_{52} = 0 \\ \Phi_2 \alpha_2 = 0 \end{cases} \Rightarrow \Phi_2 = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & -1 \end{pmatrix}$$

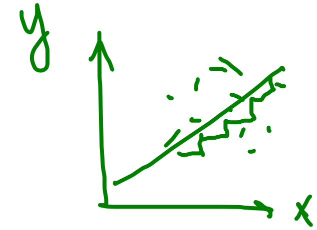
$$\operatorname{rank}(\Phi_2 A) = \operatorname{rank}\left(\begin{pmatrix} 0 & 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & -1 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ -\alpha_1 & 1-b_1 \\ a_0 & b_0 \\ a_2 & 0 \\ 0 & -b_1 \end{pmatrix} \right) =$$

$$= \operatorname{rank} \begin{pmatrix} a_2 & 0 \\ 1-\alpha_1 & 0 \end{pmatrix} = 1 = g-1$$

2) identified $\Rightarrow$ system identified

$\rightarrow 2 > 1 = g-1 \Rightarrow$ overident.

$y_i = \begin{bmatrix} 1 \\ 0 \\ 2 \\ 3 \\ \vdots \end{bmatrix}$



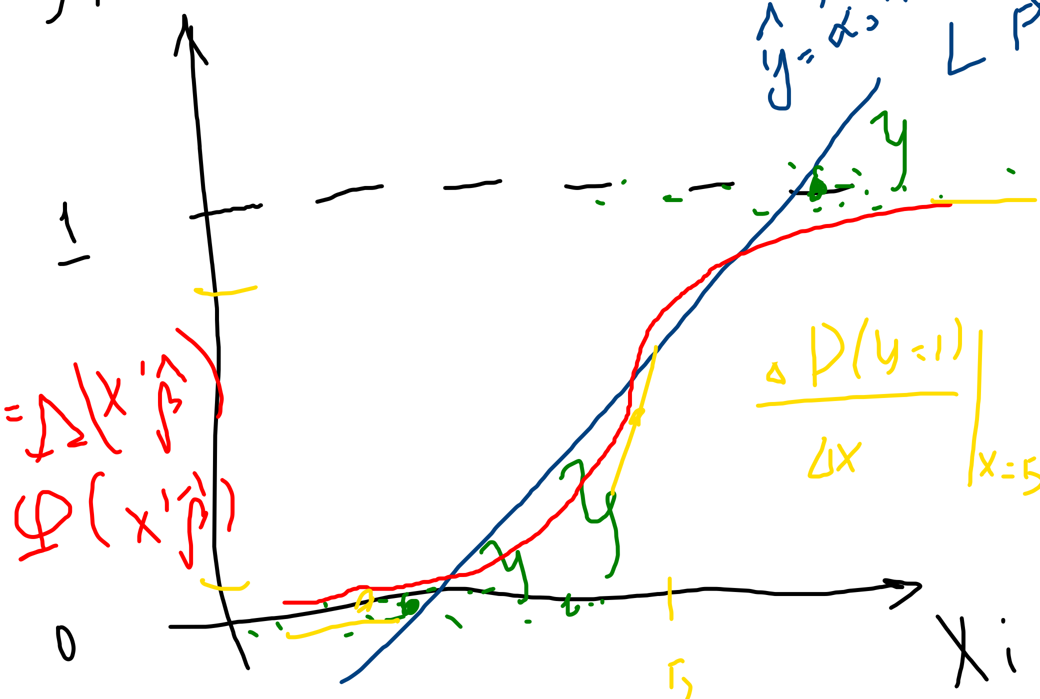
$\Delta y / \Delta x$

Binary → 2 class

- ME at $x = 5$
- ME at $\bar{x}$
- AME

$y_i = \begin{bmatrix} 0 \\ 1 \\ 0 \\ 1 \\ \vdots \end{bmatrix}$

$\hat{y} = \hat{\alpha}_0 + \hat{\alpha}_1 x_i$ LPM



$\hat{P}(y_i = 1) = \Lambda(x'\hat{\beta})$

$\Phi(x'\hat{\beta})$

$\left.\dfrac{\Delta P(y=1)}{\Delta x}\right|_{x=5}$

(−): 1) $\hat{y} \notin [0,1]$

2) M.E. is constant

3) Heterosc.

(+) Easy to est.

McFadden (pseudo)-R^2 =

$$1 - \frac{\ln(L)}{\ln(L_0)}$$

$\nearrow \ln(L_0) \approx \ln(L)$

$\Rightarrow MF\text{-}R^2 \approx 0$

$\searrow \ln(L) \gg \ln(L_0)$

$\Rightarrow MF\text{-}R^2 \approx 1$

L_0: $P(y=1) = \Lambda(\beta_0)$

F - goodness - of - fit

LR: H_0: $\beta_1 = \ldots = \beta_k = 0$

3) LR :

$H_0: P(y=1) : R \Rightarrow \ln(L_R)$

$H_a: P(y=1) : UR \Rightarrow \ln(L_{UR})$

$$LR = -2(\ln L_R - \ln L_{UR}) =$$

$$= -2 \ln\left(\frac{L_R}{L_{UR}}\right) =$$

$$= \ln\left(\frac{L_{UR}}{L_R}\right)^2 \sim \chi^2_q$$

F-test H_0 : RSS^R

H_{0_1} : RSS^{UR}

$$-2(-67+66{,}7)=+0{,}6<\chi^2_1$$