

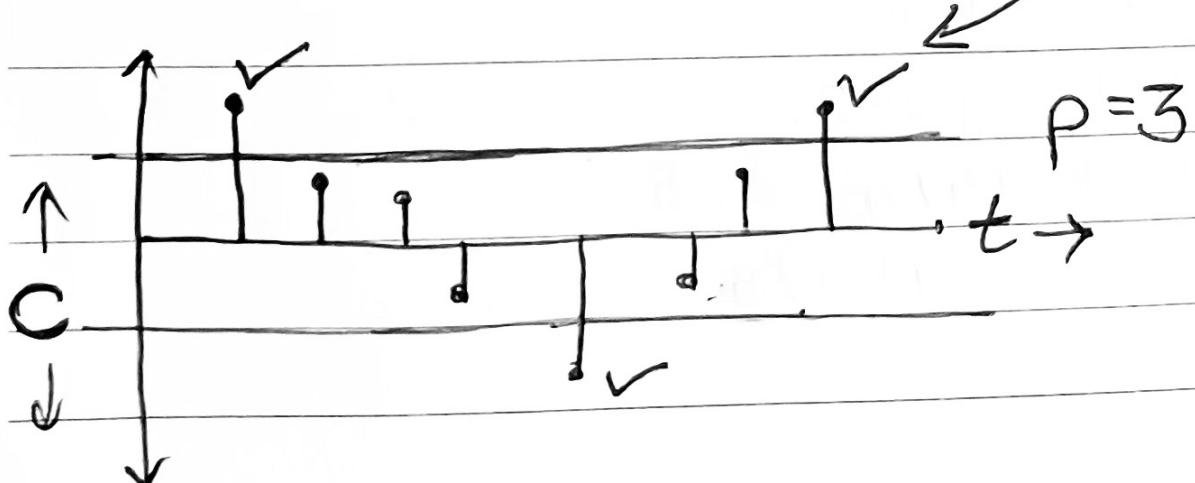
$t-3$        $t-2$        $t-1$        $t$   
 2020      2021      2022      2023

← Previous (t)      ✓ Current (t)

$$y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3$$

$$y_t = b_0 + b_1 \cancel{x_{t-1}}^{\rightarrow y} + b_2 \cancel{x_{t-2}}^{\rightarrow y} + b_3 \cancel{x_{t-3}}^{\rightarrow y}$$

$P = ?$  → PACF



→ Stationary Data



$\mu \rightarrow$  Constant

$\sigma \rightarrow$  Constant

No change w.r.t time

Augmented Dickey - Fuller Test

$H_0$  : Data is not 'S'

$H_1$  : Data is 'S'

$\alpha \rightarrow$  1% (0.01)      } Significance  
                5% (0.05)      } Level  
                10% (0.10)     }

If  $P_{value} > \alpha$  ( $H_0 \checkmark$ )

$P_{value} \leq \alpha$  ( $H_1 \checkmark$ )

$$Y_t = b_0 + b_1 Y_{t-1} + \phi_1 \Delta Y_{t-1}$$

$\downarrow$

1st  
lag

$\downarrow$

1st  
Difference

shift (1)

$\textcircled{V}$      $\textcircled{V'}$

$\downarrow$      $\downarrow$      $\rightarrow$  Difference

~~shifted~~

100    NaN

NaN

150    100

50

250    150

100

300    250

50

450    300

150

500    450

50

① D

ADF test

check if  
stationary ✓