ARMA with same polynomial

$$Y_t - \phi_1 Y_{t-1} = e_t - \theta_1 e_{t-1}$$

what if $\phi_1 = .5$, $\theta_1 = .5$?

$$(1 - .5B) Y_t = (1 - .5B) e_t$$

$$Y_t = e_t .$$

GARCH (1,1)

$$Y_t = \sigma_t e_t$$

$$e_t \sim \boxed{}$$

Normal (0,1)

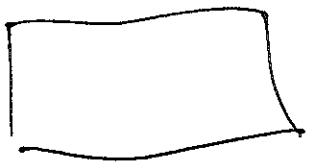
$t(5)$

Skewed $t(\cdot)$

$$\sigma_t^2 = \omega + \alpha Y_{t-1}^2 + \beta \sigma_{t-1}^2$$

ARMA(1,1)

$$Y_t = \phi_1 Y_{t-1} + e_t - \theta_1 e_{t-1}$$

$e_t \sim$ 

Normal(0,1)

$t(5)$

GARCH(1,1)

Select ARMA(P,q) order using $AICC_{normal}$

True $p=1$
$q=1$

Used ϵ_t	True ϵ_t	Correct %
Normal	Normal	
Normal	$t(5)$	
Normal	GARCH(1,1)	

Select GARCH(p,q) order by AIC

Used	True e_t	Correct %
Normal	Normal	70 %
Normal	$t(5)$	21 %
[illegible]	[illegible]	
$t(5)$	$t(5)$	72 %

ARMA parameter estimation

$$MSE = E(\hat{\phi} - \phi)^2$$

e_t	ϕ	θ
Normal	100	100 %
t(5)	109 %	99 %
GARCH(1,1)	113 %	113 %

GARCH parameter estimation

$$MSE = E(\hat{\phi} - \phi)^2$$

$e_t \sim$	ω	α	β
Normal	100	100	100 %
$t(5)$	174	218	181 %
Skew t	142	126	141 %