ECON 3350/7350
Volatility Models - I

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Tutorial 7

Regressions and Autoregressions

- Consider a regression for the mean of y_t with ARCH(q) errors:

$$y_t = \beta_1 + \beta_2 x_{2,t} + ... + \beta_K x_{K,t} + \varepsilon_t$$
$$\varepsilon_t = \nu_t \sqrt{\alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + ... + \alpha_q \varepsilon_{t-q}^2}$$

  where $\nu_t \sim N(0,1)$, $\alpha(1) < 1$, $\alpha_0 > 0$ and $E[\varepsilon_t \nu_{t-s}] = 0 \; \forall \; t, s$

- Consider an autoregressive model, AR(1), of the mean of y_t with GARCH$(1,1)$ errors:

$$y_t = a_0 + a_1 y_{t-1} + \varepsilon_t \quad |a_1| < 1$$
$$\varepsilon_t = \nu_t \sqrt{\alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1}}$$

  α_0, α_1 and β_1 to be non-negative, $\alpha_1 + \beta_1 < 1$