MGMT 675
AI-ASSISTED FINANCIAL ANALYSIS

RICE | BUSINESS
Jones Graduate School of Business

AUTOREGRESSION

OVERVIEW

- We start the forecasting part of the course.
- Forecast returns, interest rates, oil price, cash flows, …
- Possible models:
  - ARIMA (autoregressive integrated moving average)
  - exponential smoothing
  - neural networks

AUTOCORRELATIONS

- The correlation of a variable with its lagged value
- First-order autocorrelation $= \text{corr}(x_t, x_{t+1})$
- p–th order autocorrelation $= \text{corr}(x_t, x_{t+p})$
  - E.g., seasonality in monthly data captured with $p = 12$ or in quarterly data with $p = 4$.

AUTOCORRELATION OF HML

- Ask Julius to use pandas-datareader to download the monthly Fama-French factors from Ken French's data library.
- Ask Julius to produce a plot of the autocorrelation function (acf) for HML.

AUTOREGRESSIONS

- An autoregression is a regression of a variable on its own lags:

$$x_t = \alpha + \beta_1 x_{t-1} + \cdots + \beta_p x_{t-p} + \varepsilon_t$$

- Ask Julius to fit an AR(1) for HML.
- Ask Julius to use the AR(1) model to forecast HML for the next 12 months and to plot the last 2 years and the forecasts.

MORE EXAMPLES

Ask Julius to plot the ACF, fit an AR model, and forecast the following:

- Percent change in crude price: Ask Julius to use pandas-datareader to download crude oil prices starting in 1980 from FRED, to downsample to end-of-month, and to compute percent changes.
- Change in Treasury yields: Ask Julius to use pandas-datareader to download 10-year Treasury yields starting in 1980 from FRED, to downsample to monthly, and to compute changes.