MGMT 675
AI-ASSISTED FINANCIAL ANALYSIS

RICE | BUSINESS
Jones Graduate School of Business

ALPHAS AND BETAS

TOPICS

- CAPM regression
  - estimate beta for cost of equity capital
- Fama-French regression
  - estimate factor exposures (betas) and alpha for mutual fund performance evaluation

DATA FOR CAPM REGRESSION

- Ask Julius to get the monthly Fama-French factors from Ken French's data library and convert to decimal.
- Ask Julius to use yfinance to get adjusted closing prices for some ticker from Yahoo Finance.
- Ask Julius to downsample the adjusted closing prices to end-of-month and and compute returns as percent changes.

- Ask Julius to change the date type for the Yahoo returns to the monthly period format.
- Ask Julius to merge the Yahoo returns with the Fama-French factors.
- Ask Julius to compute the excess Yahoo returns by subtracting the risk-free rate.
- Ask Julius to drop rows with missing data and to filter to the last 60 months.

REGRESSION

- Ask Julius to regress the excess Yahoo returns on the excess market return.
- Ask Julius to report the regression summary.
- Ask Julius to use seaborn to create a regplot of the excess Yahoo returns on the excess market return.
- Ask Julius to use plotly to create a regplot of the excess Yahoo returns on the excess market return and to include the date in the hover data.

DATA FOR PERFORMANCE EVALUATION

- Ask Julius to get the five Fama-French factors since 1970 from French's data library and convert to decimal.
- Ask Julius to get the MOM factor since 1970 from French's data library, convert to decimal, and merge with the Fama-French factors.

- Ask Julius to use yfinance to get adjusted closing prices since 1970 for FMAGX (Fidelity Magellan) from Yahoo Finance, downsample to end-of-month, and compute returns as percent changes.
- Ask Julius to change the date type for FMAGX to the monthly period format and to merge with the MOM/Fama-French factor data.
- Ask Julius to compute excess FMAGX returns by subtracting the risk-free rate.

PERFORMANCE EVALUATION

- Ask Julius to regress the excess FMAGX returns on the excess market returns and to report the regression summary.
- Ask Julius to cumulatively multiply (1 + intercept + residual) and to plot the result.

INTERPRETATION

- The regression equation is

$$r_t - r_{ft} = \alpha + \beta_1 (r_m - r_f) + \cdots + \beta_6 \mathrm{MOM} + \varepsilon_t$$

- The ellipses represent the other terms

$$\beta_2 \mathrm{SMB} + \beta_3 \mathrm{HML} + \beta_4 \mathrm{RMW} + \beta_5 \mathrm{CMA}$$

- These terms (plus $\beta_6 \mathrm{MOM}$) represent long positions with offsetting short positions.

- Rearrange as

$$r_t = \beta_1 r_m + (1 - \beta_1) r_{ft} + \cdots + \beta_6 \mathrm{MOM} + \alpha + \varepsilon_t$$

- The part

$$\beta_1 r_m + (1 - \beta_1) r_{ft} + \cdots + \beta_6 \mathrm{MOM}$$

is a portfolio of the market, risk-free rate, and other factors that has the same betas as FMAGX.
- It is a benchmark for the performance of FMAGX.

- The part

$$\alpha + \varepsilon_t$$

is the return of FMAGX above the benchmark.

- The average return of FMAGX above the benchmark is α.
- The plot shows how the return of FMAGX in excess of the benchmark has varied over time.