

We can generalize this model to N factors:

$$\mathbb{E}[R_s] = r_f + \sum_{i=1}^n \beta_s^{F_i} (\mathbb{E}[R_{F_i}] - r_s)$$

Factor selection in a Multifactor Model

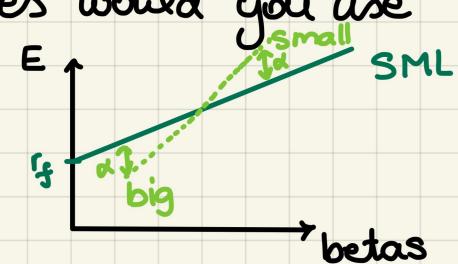
(aka Arbitrage Pricing Theory)

- Include: The Market Portfolio (financed by risk-free borrowing).

Q: What other portfolios would you include?

More precisely, which investment strategies would you use to construct the other portfolios?

- Book-to-Market Ratio
- Market Capitalization
- Momentum Strategy



Market Capitalization.

- Order the stocks by their MV.
- Find the median.
- Create S as the equally weighted portfolio w/ stocks below the median.
- Create B as the equally weighted portfolio w/ stocks above the median.
- Long S and short B to obtain Small-minus-Big (SMB).

Book-to-Market Ratio.

- Order the stocks by their $\frac{BV}{MV}$.
- Construct L as the equally weighted portfolio w/ the lowest 30% of stocks.
- Construct H as the equally weighted portfolio w/ the highest 70% of stocks.
- Long H and short L to obtain the High-minus-Low (HML).

Momentum Strategy.

- Order the stocks according to their returns over the last year.
- Create a portfolio so that you: long the top 30% and short the bottom 30%
- The portfolio you obtain: R_{PR1YR}

Fama-French-Carhart Factor Specification.

$$E[R_S] - r_f = \beta_S^{MKT} (E[R_{MKT}] - r_f) + \beta_S^{SMB} E[R_{SMB}] + \beta_S^{HML} E[R_{HML}] + \beta_S^{PR1YR} E[R_{PR1YR}]$$