Active Portfolio Strategy Framework

Gurmeet Singh
Portfolio Manager
Quad Capital
Active Portfolio Strategy (APS)

- An active portfolio strategy is also characterized as an “Alpha strategy”
  
  - \[ r_s = r_a + \beta \times r_m \]
  
  - where \( r_a \) is the unexplained component of security return \( r_s \) in relation to market return \( r_m \) (CAPM, it can be a combination of factor returns for APT)
Active Portfolio Strategy (APS)

• Given a simple linear representation of security returns, objective of an APS is to spend its effort in trying to generate a forecast of $r_a$
  
  • $r_a = \beta_1 \cdot \sigma_1 + \beta_2 \cdot \sigma_2 + \ldots$

• This is where a QUANT lives and breathes !!
Active Portfolio Strategy (APS)

• Once a good (?) forecast model with predictive signals (?) is trained, active portfolio requires

  • A definition of risk (covariance matrix of traded securities in the portfolio)

  • An optimization model to generate allocations for given constraints and utility function (Markowitz Efficient Frontier Portfolio being most popular....1990 Nobel prize in Economic Sciences)

  • Risk management based on performance or returns (feed back into allocation step)
Active Portfolio Strategy (APS)

- It can be discretionary
  - Several reputed hedge funds have discretionary Portfolio Managers managing capital
    - Generally limited to trading only a few securities
    - Often hear...gold expert, oil expert, tech sector expert
  - It can be systematic
    - Systematic funds have been proliferating and thriving in recent decade
    - With advent of API’s, fast processors and financial quants beating down on economic numbers to every tweet possible, systematic funds have made strides.
Example: Systematic Funds

- AQR Global investments
  - AUM: $159 Billion

- Bridgewater
  - AUM: $150 Billion

- Two Sigma
  - AUM: $35 Billion
Challenges of Systematic APS

• Market Price Data
  • E.g. All stocks in S&P 500 index
    • Some stocks get delisted
    • Newly included
    • Issue dividend
    • Stock Split or reverse stock split

• All of the action above must be taken in account systematically if you trade index arbitrage strategy or some other strategy (dividend, splits etc. affect market price and return computation)
Challenges of Systematic APS

- Potential signals or indicators
  - E.g. Earning forecast
    - Different stocks may get forecast on different days
    - Get one forecast per quarter (makes it sparse data)
    - Forecast from different analysts (how to weigh each analyst)
  - Good earning forecast can improve portfolio returns and a manager/quant must deal with issue above.
Challenges of Systematic APS

• Computation of Risk
  • E.g. All stocks in S&P 500 index
    • 500 X 500 or ¼ Million Variance and Covariance computations in real time
    • whether use 2 years, 5 years or longer historical returns
    • Use hourly, daily, weekly or monthly returns
    • Use half life
  
  • What makes one risk computation better than another?
  • What makes it stable?
Challenges of Systematic APS

- Given risk and returns forecast, time to allocate capital
  - Incorporate transaction cost
  - Avoid excessive transaction cost
  - Avoid risk concentration
  - Target risk/return
Challenges of Systematic APS

• Last but not the least

  • Execution and order management
    • An APS can have significant performance improvement from good execution.

  • E.g. A market neutral equity strategy trading Russell 2000 universe of stocks, looks to make 0.75bps to 1bps per million$ traded (after transaction cost). Spreads across different markets tend to be of the same order (1-2bps, higher for small-cap)
Challenges of Systematic APS

• An important mention goes to dynamic organization such that,
  
  • Indicators are easily added or removed
  • Securities are easily added or removed
  • Different exchange hours, calendar accommodated
  • Execution models can be changed
  • Live performance tracked and matched against back-test
Framework for Systematic APS

- Define Model
  - Model Info
  - Data Info
  - Indicator Info
  - Forecast Info
  - Optimization Info
  - Order Info
  - Exchange Info
Framework for Systematic APS

- Get Data
  - Get Reference Data
  - Get Currency Data
  - Get Market Price Data
  - Get Indicators Data
Framework for Systematic APS

• Get Derived Data (examples of stocks, futures)
  • Compute Returns Data
  • Compute Risk Data
  • Compute Target Data
Framework for Systematic APS

- Compute Indicators
  - Indicator logic
  - Normalized to match security master
- Compute Betas
  - Linear regression
  - Time series, Spatial or Panel
- Compute Forecast
  - Select forecast horizon
Framework for Systematic APS

- Compute Positions
  - Define constraints
  - Normalize forecast and risk
  - Run constraint optimization

- Compute Performance
  - Position Gains
  - Trade Gains
  - Turn over
  - Trading cost (spread, commission, slippage)