# Principles of Asset Allocation

S.D = standard deviation

## 1. INTRODUCTION

Two separate decisions for a diversified multi-asset class portfolio includes:

- Asset allocation decision – translating the client's goals & constraints into an appropriate portfolio.
- Implementation decision – determining specific investments

## 2. DEVELOPING ASSET-ONLY ASSET ALLOCATION

### 2.1 MVO Overview

- MVO requires 3 inputs: i) returns, ii) risks and iii) related assets' pairwise correlations.
- Risk-adjusted exp. return = $U_m = E(R_m) - 0.005 \lambda \sigma^2_m$
- *Common Constraints are 'budget constraint'* & 'no negative or short position'.
- To estimate risk aversion, determine investor's risk preference & risk capacity
- 'Global min. variance portfolio', has the lowest risk & is located at the far left of the efficient frontier.
- 'Max. expected return portfolio' is the portfolio at the far right of the frontier. If no constraints, the max. exp. return portfolio allocates 100% in the single asset with the highest expected return.
- MVO is a single-period framework

### 2.2 Monte Carlo Simulation

- is a statistical tool
- generates a no. of strategic asset allocations using random scenarios for variables such as: returns, inflation, time frame etc.
- delivers more realistic outcome
- helps to evaluate the strategic asset allocation for multi-period time horizon.
- incorporates effectively the effects of Δ in financial markets, trading or rebalancing costs & taxes.
- complements MVO by tackling the limitations of MVO.

### 2.3 Criticisms of MVO

- outcomes are sensitive to small Δ in inputs.
- highly concentrated asset classes.
- focuses on the mean and variance of returns only.
- may fail to properly diversify the sources of risk.
- does not consider the economic exposures of liabilities.
- not useful for multi-period objectives.
- does not take into account trading/rebalancing costs and taxes.

### 2.4 Addressing the Criticisms of MVO

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### 2.5 Allocating to Less Liquid Asset Classes

Including less liquid asset classes in the optimization is challenging as indexes fail to gauge aggregate performance of asset class: the characteristics of assets differ significantly because of idiosyncratic (co. specific) risk.

### 2.6 Risk Budgeting

- finding optimal risk budget to maximize return per unit of risk.

Some key computations for risk budgeting:

- Marginal contribution to risk ($MCTR_i$) = (Beta of Asset Class *i* relative to Portfolio) x (Portfolio S.D)
- Absolute contribution to risk ($ACTR_i$) = $Asset\ class\ weight_i$ x $MCTR_i$
- Portfolio S.D = Sum of ACTR = $\sum_i^n ACTR$
- % contribution to total S.D = $\frac{ACTR_i}{Portfolio\ S.D}$
- Ratio of excess return to MCTR = $\frac{(Expected\ Return - R_f)}{MCTR}$

### 2.7 Factor-Based Asset Allocation

focuses on optimization to an opportunity set consisting of investment factors (fundamental or structural)

## 4. DEVELOPING GOALS-BASED ASSET

### 4.1 The Goals-Based Asset Allocation Process

Two essential parts of this process are:
1. creating portfolio module
2. matching each goal with suitable sub-portfolios.

- Advisors usually apply pre-established models that best serve the purpose.
- Different modules represent different features e.g. implied risk/return tradeoffs, liquidity concerns, eligibility of some asset-classes or strategies.

### 4.2 Describing Client Goals

The advisor estimates the amount allocated for each goal and the asset allocation that will apply to that sum and then selects the suitable module

### 4.3 Constructing Sub-Portfolios

Distinguish b/w cash flow based-goals (for which cash flows are defined) and labeled goals (for which investor is unclear about the need).

### 4.4 The Overall Portfolio

The overall asset allocation is aggregation of individual exposures

### 4.5 Revisiting the Module

- Because of constraints, the resultant frontier is not therefore, following concerns are crucial.
  i. Liquidity concerns
  ii. Non-normal return distribution
  iii. Include drawdown controls
- Regularly revise: modules & investor constraints

### 4.6 Periodically Revisiting the Overall Asset Allocation Process in Detail:

- Time horizons are generally rolling concepts
- Portfolios, typically, outperform the discount rate and resultant excessive assets need rebalancing

### 4.7 Issues related to the Goals-Based Asset Allocation

Managing more than one policy for each client, Handling portfolios on day-to-day Satisfying regulatory requirements of treating all clients equivalently

## 5. HEURISTICS AND OTHER APPROACHES TO ASSET ALLOCATION

Some other offhand techniques for asset allocation

- **120 minus your age rule**
  120 minus age = equity allocation
- **60/40 stock/bond heuristic**
- **Endowment Model or Yale model**
  allocates large portion to non-traditional investments (private equity, real-estate)
- **Risk Parity** (each asset class should contribute evenly to the overall portfolio risk). Mathematically:

$$w_i \times Cov(r_i, r_P) = \frac{1}{n}\sigma_P^2$$

- **The 1/N rule** involves allocating equal % to each of (N) asset classes.

## 6. PORTFOLIO REBALANCING IN PRACTICE

| Factors & their relation with corridor width | Effect on optimal width of corridor (all else equal) |
|---|---|
| Transaction costs +ve | ↑ transsaction cost, wider the corridor |
| Risk tolerance +ve | ↑ risk tolerance, wider the corridor |
| Correlation with the rest of the portfolio +ve | ↑ correlation, wider the corridor |
| Volatility of the rest of the portfolio -ve | ↑ volatility, narrower the corridor |