

# 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  $\Delta$  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  $\Delta$  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

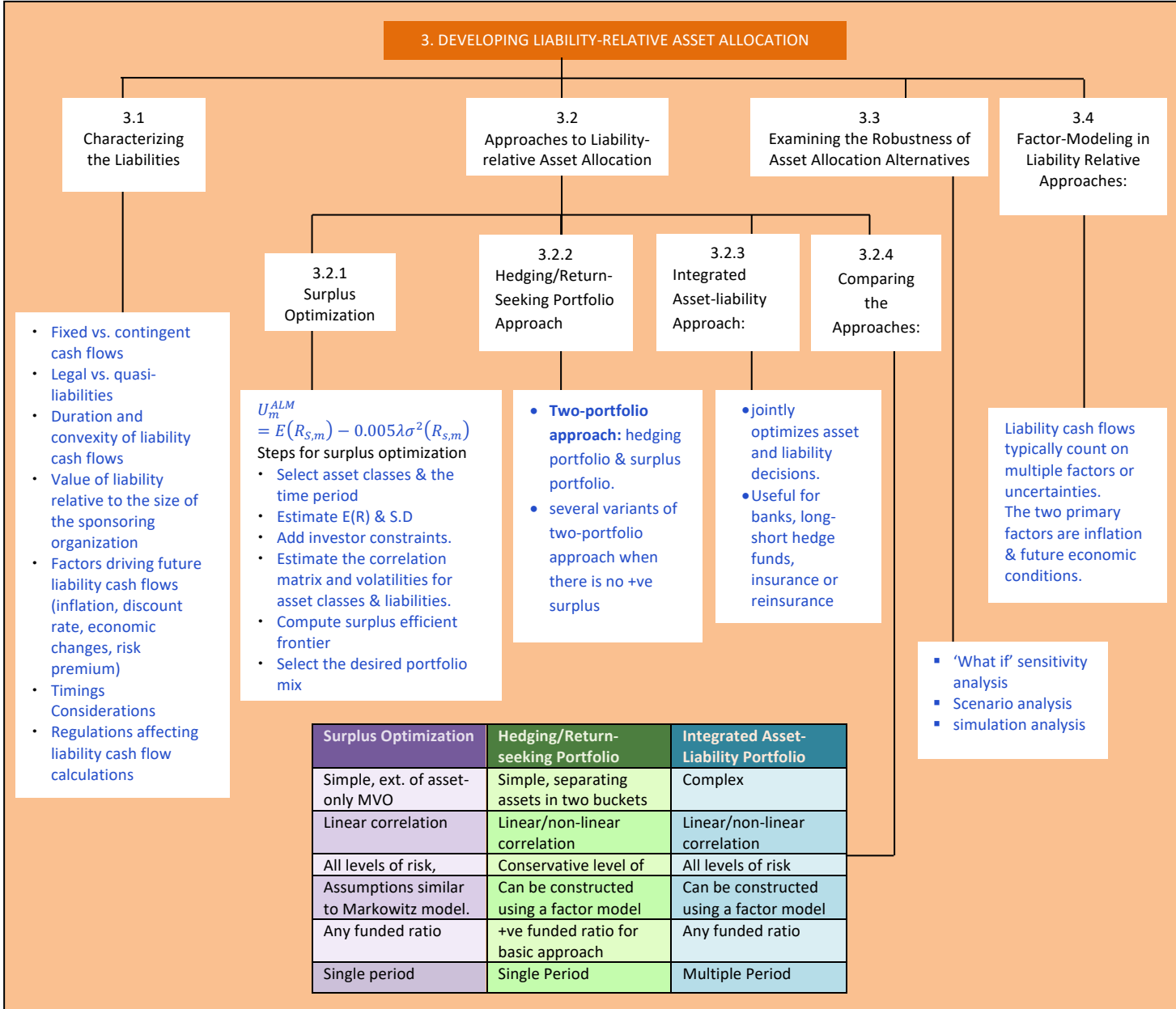
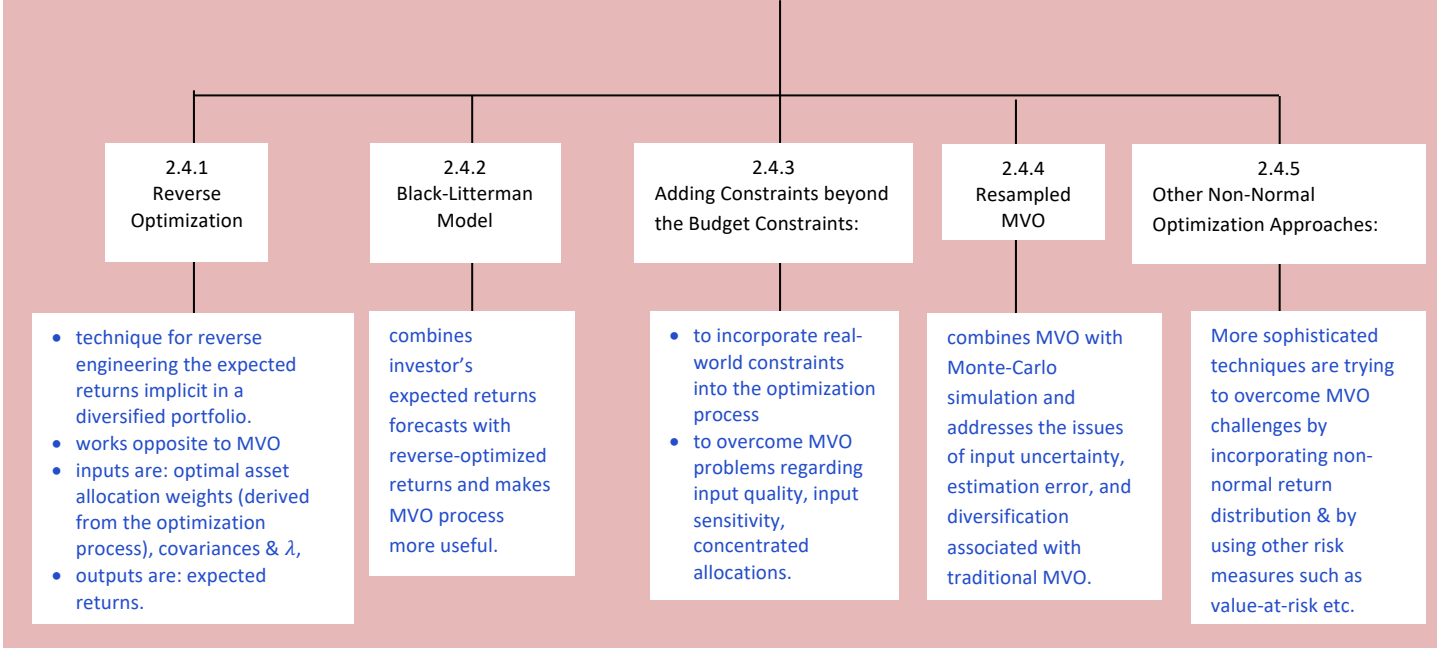
Including less liquid asset classes in the optimization is challenging as indexes fail to gauge aggregate performance of asset class: the characteristics of assets differ significantly because of idiosyncratic (co. specific) risk.

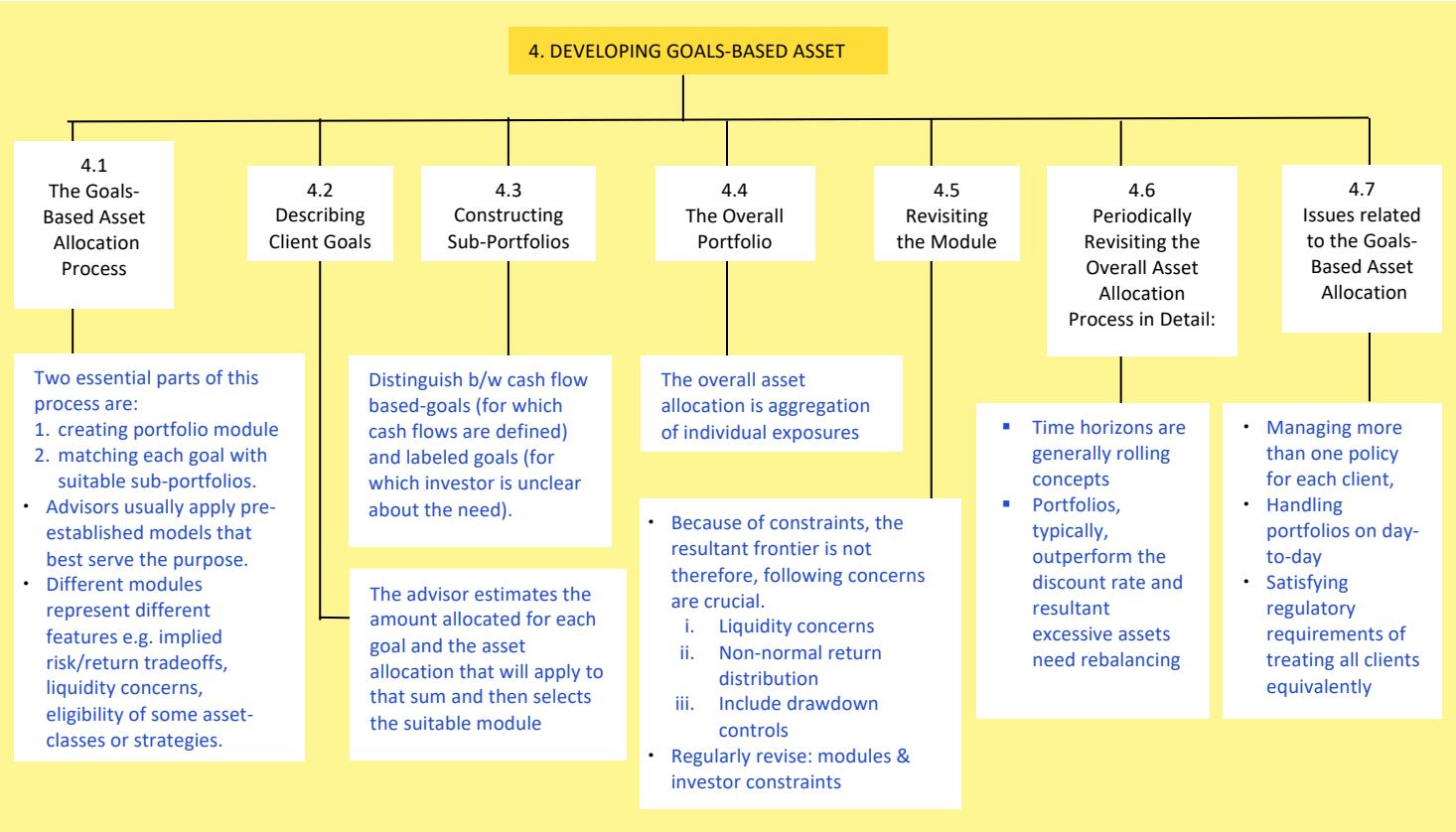
### 2.6 Risk Budgeting

- 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)  $\times$  (Portfolio S.D)
  - Absolute contribution to risk ( $ACTR_i$ ) =  $Asset\ class\ weight_i \times MCTR_i$
  - 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)





### 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	↑ transaction 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