A journey in the jungle of asset allocation methodologies

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What are we talking about - What is asset allocation?

- A framework which helps decide allocation between a given set of assets, for a given set of objectives and constraints
- A procedure help determine what is feasible and what is not feasible
- Asset allocation does not choose WHICH assets to invest in, but just how to determine the proportion between the assets.
Background
Setting the scene: elements which affect asset allocation

Characteristics of the investable universe

Risk:
- Volatility;
- Maximum loss;
- Expected shortfall.

Reward:
- Expected return;
- Growth rate.

Constraints:
- Risk budgets;
- Sector;
- Regulation.

Objectives:
- Minimise risk;
- Maximise efficiency.
Seeking an adequate balance between risk and reward
### Asset allocation: an historical path paved with Nobel prizes

**Before 1924:** Market accessible only to very wealthy investors. First mutual fund launched 1924.

**1934:** Benjamin Graham: “The intelligent investor”
- Picking winners and concentrate holdings to maximize returns: **allocation is about sizing bets.**

**1952-1964:** Markowitz and Sharpe: refocus on risk and portfolio structure: diversification and portfolio optimisation.

**1966:** Fama, Samuelson: “Investors cannot consistently identify superior stocks using fundamental information or price patterns”.

**1980:** Shiller: Markets are less efficient than thought! Educated views are important.
Modern Portfolio Theory
Efficient frontier: the allocator’s baseline

- Efficient Portfolio
- Aggressive Investor
- Prudent Investor
- Cash
- Bonds
- Equities
- Capital market line
- Minimum risk allocation to risky assets

Source: Unigestion
Diversification: a key concept

- Markowitz shifted the investment paradigm:
  - “Nothing ventured, nothing gained”
  - “Don’t put all your eggs in one basket”.

- Two components of risk:
  - Systematic and unsystematic risks.

\[\text{Unsystematic risk: can be eliminated by diversification}\]

\[\text{Market risk: systematic}\]

Source: Unigestion
Markowitz: nice in theory, difficult in practice

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
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<td>\ Investable universe.</td>
<td>\ Extreme dependence on expected returns.</td>
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<td>\ Objectives and risk tolerance.</td>
<td>\ Small changes can have a big impact.</td>
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<td>\ Quantitative figures.</td>
<td>\ Resulting allocations may be counter intuitive.</td>
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<td></td>
<td>\ Not as objective as it sets out to be.</td>
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<td>\ Large emphasis on optimisation.</td>
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<td>\ Intuition about simple investment rules is not used.</td>
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Optimised portfolio
Use with caution!
**Warning 1:** High risk is attractive because it suggests high returns.

The higher the risk is, the harder it is to accurately estimate expected return.

The higher the beta of the asset, the more expensive it is.

Applies to one period only.

\[ \text{Expected return} \]

\[ \text{Risk} \]

... BUT, this is an unreliable rule of thumb.

Source: Unigestion
Buffet’s rule no. 1: do not lose money

Getting back to even gets harder the more you lose.

The low volatility side of the efficient frontier therefore becomes more interesting.

Source: Unigestion
A puzzle: the low volatility anomaly (R.A. Haugen and A.J. Heins 1972)

Low-volatility stocks have produced higher risk-adjusted returns than portfolios with high-volatility stocks

Source: GMO As of 9/30/11
Warning 2: The forgotten enemy, estimation error

Risk, return and correlation parameters are estimated from a limited time series - this transforms into a decision error.

The decision error:
- clouds your judgment;
- clouds the judgment of the optimiser.

Concentration on a smaller number of assets for which you have enough information becomes the sensible option.
Main source of error

\- Lack of sufficient information

\- Quality of estimate is measured by $Q = \frac{T}{N}$

\- Theoretically, we need $Q >> 1$.

\- Practically, $T$ is severely bounded

Portfolio’s Dimension must be reduced
The Forgotten enemy that may fool the Theory

**Estimation Error**

- Parameters have to be estimated from a limited time series $\Rightarrow$ Decision Error
- Error diverge for a critical value of $N/T$. Role of Constraints $\Rightarrow$ Walls
- For fat tails use ES. But then the solution may even be impossible to find!
- Alpha is a Zero sum Game

Avoid over-diversification

Imre Kondor
Collegium Budapest and Eötvös University
What do investors actually need in an asset allocation method?

- Guidelines to help decide allocation between a given set of assets.
- That the results of the allocation will give a portfolio which intuitively feels right.
- Some element of influence and interaction with the framework.
- Probably do not need a robot which decides for them!
What are we left with?
Some remarkable schemes
Risk estimates are more reliable than return estimates

Source: V. Chopra & W Ziemba [1993]
## A spectrum of allocation methods

<table>
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<tr>
<th>Approach</th>
<th>Principle</th>
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<tr>
<td>Efficient portfolio</td>
<td>Maximum expected return per unit of expected risk</td>
</tr>
<tr>
<td>Minimum risk</td>
<td>Minimum risk allocation to risky assets</td>
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<tr>
<td>Equal risk contribution</td>
<td>Allocation for which each asset has the same contribution to overall risk</td>
</tr>
<tr>
<td>Equally risk weighted</td>
<td>Each weighted investment line in the portfolio has the same risk</td>
</tr>
<tr>
<td>Equally weighted</td>
<td>Each investment has the same weight</td>
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</table>
Where Benjamin Graham and Markowitz Meet

- Pre-MPT common sense
- Feasibility: avoid over-diversification
- Evidence: favour low risk
- MPT models

Risk-based portfolios
Risk-based allocations are much more robust

An alternative look at the efficient frontier – information is key

Source: Unigestion
A quick zoom on the equally risk-weighted approach
The equally risk-weighted approach: key principles

\Objective: \text{each asset within the portfolio carries the same undiversified risk.}

\Allocation rule: \text{the riskier the asset, the lower the allocation.}

\Information needed: \text{only average information correlation, and asset’s risk matters – the model is stable.}

\Assumptions: \text{the universe of assets is pre-defined.}

\Philosophy: \text{fosters synergy between quantitative and qualitative approaches.}

\Advantages: \text{extremely robust (what you expect is what you get).}

\Caveats: \text{pre-selection of assets is critical.}
The advantage of the average

For a given set of assets, there is no need for optimisers visual interpretation alone can work!
How does the ERW approach work in practice?

\- Robustness: errors are reduced by using average values of all inputs.

\- Diversification: defined by your maximum volatility target based on pre-selected assets.

\- Correlation: average correlation between lines (assets) defines how many lines is too many.

\- Selection: guided only by how an asset change (addition or removal) affects the average properties of the portfolio.

\- Simplicity: you don’t need an optimiser!
The key advantage of risk-focused asset allocation

In the long run, markets reward investors who focus on controlling risk rather than chasing returns.

Risk contributions have a greater impact than asset weights:

Source: Unigestion
Concluding remarks

- Maths is useful but must be used as a decision making tool – use with caution!

- Low risk portfolios are more attractive than high risk portfolios.

- Over-diversification kills the model, the alpha, the intuition and the result.

- In a concentrated portfolio, fundamental analysis and market knowledge is a key complement to the model.

- Sub-optimal portfolios may be optimal given the information available.

- Game theory which was in vogue pre-Markowitz allocation methods, contains a number of forgotten advantages.

- these will be explored in the workshop.
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