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ASSET ALLOCATION STRATEGY IN INVESTMENT PORTFOLIO CONSTRUCTION – A COMPARATIVE ANALYSIS

Abstract

The investment portfolio management process consists of an integrated set of steps to create an appropriate mixture of assets. Since it is highly depending on characteristics of the investor, it is possible to stress three main steps: planning, execution and feedback. The most crucial part of portfolio management is the execution step during which a suitable portfolio is built. The procedure takes into account asset allocation, security analysis and clients' requirements. The main aim of the article is to present and compare asset allocation procedures used today, such as mean-variance approach, Black–Litterman one and risk based strategies.

Keywords: *strategic asset allocation, investment policy*.
JEL classification: *G11, D81*.

Introduction

The global financial crisis in 2007-2009 made investors to revisit their investment policy because of the apparent under-diversification and risk control failure. A list of next generation solution is proposed to displace modern portfolio theory generally based on various versions of risk-based asset allocations.

1. Asset allocation

Asset allocation could be defined as the process of sharing the portfolio into number of asset classes (Sharpe 1992, pp. 7-19). The general idea is to move the emphasis from the security level to the portfolio level.

It is worth to mention that the procedure is not simply based on coincidental investment in different asset classes (e.g., stocks, bonds, gold, and real estate) but on finding a range of investments that perform differently in the market. A proper diversification remains an essential feature of modern portfolio theory (Wolfinger, 2005, p. 7).

Generally, the investment management process could be understood twofold as strategic asset allocation or tactical asset allocation with market timing.

Strategic asset allocation (known also as policy asset allocation) is understood as an allocation within the portfolio into the major asset classes in accord-

ance with the investor's long-term objectives (Amenc, Le Sourd, 2003, p. 9). The purpose of this procedure is not to beat the market, but to create an asset mix which will establish an optimal balance between expected return and investor's risk tolerance for the long-term horizon (to maximize the probability of achieving long-term goals at an accepted level of risk).

The asset classes chosen for strategic asset allocation should satisfy the following five criteria:

- assets within an asset class should be relatively homogenous,
- asset classes should be mutually exclusive,
- asset classes should be diversifying,
- asset class as a group should make up a predominance of world wealth
- asset class have the capacity to absorb a significant fraction of the investor's portfolio without seriously affecting the portfolio liquidity (Maginn, Tuttle, McLeavey, Pinto, 2007, p. 49).

Traditionally the strategic asset allocation tends to be constrained into equities, bonds, real estate and cash with the long time horizon ranged between 10 and 50 years. Due to its long-term nature, weights which show the percentage range of asset allocation are called targets. Additionally the very long-term asset allocation is usually understood as the benchmark allocation tied to broad asset classes that establish the policy risk for the fund, known as the beta or market risk for the fund. (Rasmussen, 2003, p. 281). This process combines capital market expectations (formally represented by the efficient frontier) and the investor's risk & return, and investment constraints (from the investment policy statement).

Although it is expected that a strategic asset allocation decision will be effective over the medium to long term, the allocation might be reviewed and revisited in the light of changing investment opportunities or getting out of wages outside specified range (Idzorek, 2006).

Tactical asset allocation attempts to add value to strategic asset allocation through looking for short-term opportunities which let receive an extra return from financial market. The process is based on overweighing those asset classes that are undervalued and under-weighting these ones which are overvalued. The permitted level of tolerance established for the reference portfolio at the beginning should not be significantly changed.

While the decision-making process for a strategic asset allocation requires long-term expectations of asset class returns, volatilities, and correlations as inputs, for the tactical asset allocation it needs a short to medium-term decision related to business cycles or market sentiment. Typically, tactical asset allocation covers a modifications of the asset mix within the portfolio due to the eco-

nomic news or technical factors coming from financial markets. The process can be performed either as a part of a regular allocation program that monitors market conditions and sectors, or as irregular reaction onto unexpected changes in asset prices or interest rates.

Market timing is based on very short-term decisions ranged from 1 day to 1 month. It is related to the market sentiment which influences volatility level. Timing involves using information about trend's reversals, changes in variances or correlation characteristics of asset classes to generate additional return (Fabozzi, Focardi, Jonas, 2010, p. 15).

Both types of asset allocations are strictly linked with the time (the investment horizon) which influences the fundamental decision. From the long perspective the strategic asset allocation procedure allows controlling long-term goals, while short and medium perspectives seek out opportunities to increase the return.

2. Selecting procedures

The composition of an appropriate portfolio (from the investor's point of view) lead to the optimal allocation of assets which satisfy both the investor's risk tolerance and his expected rate of return. The asset allocation process can entail either quantitative or qualitative techniques. Since qualitative techniques are generally subjective in nature, the quantitative ones reflect the advances of modern portfolio theory with necessity of precise procedures.

Below there is a description of some typical approaches to asset allocation: mean-variance approach, re-sampling mean-variance optimization, Black–Litterman model and risk based portfolio construction.

Mean-variance optimization

The most widely used asset allocation framework is mean-variance optimization described by Markowitz (1952, 1959). The procedure maximizes expected return for a given level of risk or equivalently minimizes risk for a given return. Generally the procedure covers following steps:

- specifying assets for strategic asset allocation, with the weights summed to one,
- model forward-looking assumptions: expected return, risk and correlations,
- optimization algorithm: mean-variance optimization to create an efficient frontier,
- portfolio selection: based on estimated risk tolerance level there is a point on the efficient frontier.

The most important assumption in classic mean-variance approach is the necessity of asset class returns' normality. Unfortunately in reality asset class returns are not normally distributed, however, ignoring skewness and kurtosis may create riskier portfolios.

The other key limitation affecting the mean-variance approach is its high sensitivity to the estimates of returns, standard deviations, and correlations (Best and Grauer, 1991). It leads to asset allocations in which the majority of the holdings are concentrated in a small number of asset classes that make up the opportunity set, contradicting the common-sense notion of diversification. And what is more vital, the important asset classes are usually excluded from the portfolio.

Additionally, most investors have multi-period objectives while the mean-variance framework is a single period optimization model. As a result, a recommended portfolio that was optimal in one period, could not have been optimal in the other one.

Re-sampling

The second approach to asset allocation is re-sampled efficient frontier which rely on generating an efficient frontier through Monte Carlo simulation. This approach is based on a simulation exercise using mean-variance optimization and data set of historical returns.

It utilizes historical means, variances and covariances of asset classes, that combined with capital market forecasts represent the investor's expectations. Re-sampling takes into account results from efficient portfolio simulations received with assumption of different set of parameters (for expected return, risk and correlation). Because the simulation is run thousands of times, the efficient portfolio are determined for each level of return or risk. The average of weights for simulated efficient portfolios is calculated and creates a re-sampled efficient frontier. As a result at each level of return, the most efficient is the centre of a distribution. The re-sampled efficient frontier created in such a way tends to be more diversified and more stable over time (the traditional mean-variance optimization lead to a single portfolio with very specific asset class weights at each level of return) (Michaud 1998).

Re-sampling has two key advantages over traditional counterpart. First, because it utilizes an average process, the general efficient frontier is more stable than a traditional mean-variance efficient frontier; small changes in input variable result in only minor changes in the re-sampling efficient frontier. Subsequently, portfolio generated through this process tends to be better diversified.

By utilizing re-sampling technique, a portfolio manager is able to judge the need for rebalancing. In fact, most or all asset classes are represented in the re-sampled efficient frontier.

The biggest disadvantages of re-sampling is its lack of a sound theoretical basis. There is simply no theoretical reasons to support the content that a portfolio constructed through re-sampling should provide superior performance relative to another constructed through traditional mean-variance analysis. The relevance of historical return frequency data to current asset market values and equilibrium is also questionable.

The Black–Litterman Model

The Black–Litterman model was firstly described by Fischer Black and Robert Litterman (Black and Litterman, 1992). The model enables investors to join their personal views regarding the behavior of various assets with CAPM market equilibrium returns in a manner that results in intuitive, but diversified portfolios. As a result, this approach (comparing to traditional mean-variance optimization) helps practitioners overcome the biggest weakness that was highly concentrated asset allocations.

The main objective of this procedure is to create a stable, mean-variance efficient portfolios which overcome the problem of expected return sensitivity. The procedure could be divided into several steps:

- the preparation of the equilibrium market weights and covariance matrix for all asset classes.
- the calculation of the equilibrium expected returns which allow to formulate the neutral starting point.
- a subjective decision for portfolio weights – to combine the subjective views of an investor regarding the expected returns of assets with the CAPM market equilibrium expected returns (the prior distribution).
- the calculation of the view-adjusted market equilibrium returns and construction the mixed estimate of expected returns (the posterior distribution)
- the mean-variance optimization which lead to efficient frontier that produce to well-diversified asset allocations.

In Black–Litterman model investors incorporate individual outlook on the asset class returns and therefore modify the expected return. Using these mixed return, the mean-variance optimization is applied. If there is no particular expectations about asset class performance, the weights into the portfolio will be the same as weights coming from CAPM market model. Then, with the weights

recently received, the average risk tolerance is added to point out the best portfolio which fulfil the investor risk and return balance.

The big advantage of Black–Litterman model is the ability to overcome the problem of theoretical, highly concentrated, input-sensitive portfolios which are usually the end product of the mean-variance optimization. The Black–Litterman procedure is able to omit this problem through dissemination of the errors in the entire set of expected returns.

Risk-based strategies

The wide consequences of 2007-2009 crisis has modified thinking about asset allocation from risk-return perspective into risk perspective. There are some most popular techniques which do not involve expected return as an input data.

The simplest method is based on a naive diversification – the weights are equal (for n assets, weights are equal to 1/n). The method completely ignores return and risk prospects (the heuristic portfolio). The consequence of such construction is a non-appropriate asset allocation – highly sensitive to universe of assets under consideration (input data).

The second method uses construction of the global minimum variance means portfolio of risky assets with the lowest possible volatility. It could be uniquely determined just with a covariance matrix. The construction leads to concentrated (not diversified) portfolios with high sensitivity to frequency of rebalancing and weight constrains.

Third type was introduced by Choueifaty and Coignard (2008) and aims for finding the most diversified portfolio. The method introduced maximum diversification portfolios through a measure called diversification ratio. The index expresses relation of the asset's weighted average volatility to overall volatility and measures diversification gained from holding uncorrelated assets. The higher the ratio, the more diversified portfolio. Consequently the most diversified portfolio is the one which maximizes the ratio. The squared value of diversification ratio expresses an independent risk factor.

Fourth type of risk based strategies – equal risk contribution – was widely applied by Maillard, Roncalli, Teiletche (2008). The idea of this procedure is to find a risk-balanced portfolio, such that the risk contribution, which is the same for all assets in portfolio. As a result the portfolio weights are endogenous in determining asset's risk contribution and a given risk parity remains heuristic in nature.

3. A comparative analysis

All those seven procedures of asset allocation have to be compared with main focus on their features. The characteristics cover several aspects: the construction procedure, level of diversification achieved and involved limitations. The asset allocation methods are to be described using the following abbreviations:

- mean-variance optimization – MVO
- re-sampling – RE-MVO
- Black–Litterman model – BL
- naive diversification – N-DV
- the global minimum variance approach – GMV
- the most diversified portfolio – MDP
- equal risk contribution – ERC.

Table 1. A comparative analysis

	EFFICIENT PORTFOLIO	DIVERSIFICATION	LIMITATIONS
MVO	a point on effective frontier which is consistent with accepted level of risk	weak – leads to highly concentrated portfolio	– risk underestimated input fragility – static procedure (one-period) approach
RE-MVO	a point on re-sampled efficient frontier which is consistent with accepted level of risk	average – reasonable stable portfolio	– risk underestimated – the relevance of historical return frequency data to current asset market values is questionable
BL	stable efficient frontier coming from mixed construction of expected returns (based on market) and investor's intuition	intuitive, but well diversified portfolio	– risk underestimated as a consequence of input of investor's intuition – relies on CAPM theory
N-DV	the heuristic portfolio – as accurate as the inputs	depends on the chosen number of assets	– ignores return and risk forecasts – procedure highly sensitive to input data
GMV	portfolio of risky assets with the lowest possible volatility	weak – leads to highly concentrated portfolio (not diversified)	– high sensitivity to frequency of rebalancing and weight constrains
MDP	maximum diversification portfolios thanks to the diversification ratio	highly diversified	– the return is not taken into account
ERC	risk-balanced portfolio such that the risk contribution is the same for all assets in portfolio	very limited diversification of risks if individual risks are significantly different	– portfolio weights are endogenous in determining asset's risk contribution – risk parity remains heuristic in nature

The question arises: how a modern investor should diversify his portfolio. According to latest research (DeMiguel, Garlappi, Uppal, 2009; Jacobs, Muller, Weber, 2014) it is still difficult to show the best one. There is a need to analyse the risk tolerance and time horizon – the most important variables in modern portfolio alchemy.

Conclusions

Summary presentation of seven portfolio construction methods: three traditional and four risk based strategies allow to compare them and identify their pros and cons.

It should be emphasized that one of the effects of 2007-2009 crisis is the increasing importance of methods focused on risk level and risk volatility.

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