



Optimization as a Journey

Portfolio multi-period probability optimization in two steps: planning and execution.

Financial markets have undergone a protracted period of expansion that has significantly increased investment opportunities available to private investors. However, the abundance of financial vehicles (both traditional investments and newly created ones through financial innovation) coupled with excess cash on international markets did not reduce risks but fuelled market instability, turning the search for superior yield into an even greater challenge. The interconnectivity among financial markets and global economies has increased contagion risks and generated positive correlation shifts among asset classes during market downturns, adding extra complexity to the wealth management process of building diversified global asset allocations.

The dynamics of S&P500 and USD short-term yields for the last 30 years show the need to extend optimization capabilities to encompass frequent changes in financial markets conditions over multiple time periods.

Table 1 and 2: Dynamics of S&P500 and USD short term yields for the last 30 years:

S&P 500 (Levels)		
Period	Start	End
1980-1990	98.22	337.89
1990-2000	337.89	1553.11
2000-2003	1553.11	804.19
2003-2007	804.19	1576.09
2007-2009	1576.09	695.27
2009-2013	695.27	1597.35

USD One-year Interbank Deposit (%)		
Period	Start	End
1982-1983	16.50	8.87
1983-1984	8.87	13.62
1984-1986	13.62	5.50
1986-1989	5.50	11.24
1989-1992	11.24	3.12
1992-1995	3.12	7.62
1995-2000	7.62	7.45
2000-2003	7.45	0.90
2003-2006	0.90	5.70
2006-2013	5.70	0.53

Table 1 and 2: Dynamics of S&P500 and USD short term yields for the last 30 years



Modern portfolio theory might not equate to all the challenges affecting today's environments, since it does not properly address non-linearity and is restricted to a single time horizon, as opposed to multiple time steps. Therefore, a new approach is needed in investment design, to enable wealth managers to build a more robust framework for investment advisors where portfolio compositions can be reallocated through time and enable the following:

- Consider *actual products* instead of linear asset classes, without losing pull-to-parity properties (for example, convergence to IRR at maturity for bond investments) and convex risk-return profiles (for example, embedded options);
- Consolidate *past and future performance* into a meaningful indicator (for example, probability of achieving a target return);
- Gain insights in *current and stressed market conditions*;
- Include real clients ambitions and constraints, instead of relying only on market statistics;
- Consider the time horizon as a set of *multiple time steps* as opposed to a single time period.

By doing so, portfolio optimization can be transformed from an abstract mathematical exercise, identifying a seemingly abstract “theoretical optimized portfolio,” into a more practical, real-world exercise. Portfolio optimization should be viewed as a *journey*, where private investors are guided through asset reallocation proposals leading to a rebalancing of their portfolio.

This anticipates changes in market conditions and encompasses their personal financial goals and ambitions. This is a journey in which private investors can travel with the tools and equipment necessary to enjoy the trip, as well as cope with the abrupt changes in the terrain.

Placing investors' preferences first—during the planning as well as the execution of this journey—requires:

- A catalog of *validated investment opportunities* (selected by wealth management professionals with the required skills and experience);
- An understanding of the timing necessary for investment/disinvestment (using the *Mark-to-Future* framework provided by IBM Risk Analytics);
- Access to a sound transportation system that not only takes investors to their desired destinations, but also allows them to customize the journey according to their preferences, ambitions and restrictions (adopting the *portfolio multi-period probability optimization in two steps*).

While building institutionalized investment processes is fundamental to success, this does not mean that advisors lose the flexibility to customize portfolios to meet individual requirements since this is key to building stronger client relationships.

The optimization capabilities allow private advisors to design an optimized portfolio for each individual client. By comparing this with their current holdings, it is easier for the advisor to rationalize the advice given as they rebalance their client's portfolio. In particular, it enables advisors to:

- *Optimize portfolios on real investments* (still aggregating results by asset classes) to represent consistently the contributions of non-linear payoffs to portfolio performance;
- *Compare optimal portfolios with actual asset allocations* to identify—with intuition and graphical representation—the current risk-return gaps and the opportunities for improvement;
- Provide wealth managers with *optimization as a “what-if”* exercise that does not involve complex mathematics (even though it is built on a robust statistical foundation).

While the personalized optimization journey is clearly relevant for Ultra High Net Worth clients, there is a strong business case to apply the same optimization capabilities and principles to the investment process for a broader target market including Mass Affluent and High Net Worth clients.

Planning the journey

1. *Product selection*: out of the tens of thousands of investment opportunities available, wealth managers select a set of investment products (constituting a “catalog of favorable investment products,” for example, 100 products) based on:
 - Intrinsic criteria (for example, track record of the asset manager, quality of the issuer, level of capital protection and payoff);
 - Extrinsic elements (for example, underlying market trends and sector/geographical segmentation).
2. *Client profiling*: client profiles are developed and each client is allocated to a certain segment or grouping based on:
 - Personal financial goals (target total return over time);
 - Risk profile (total risk appetite over time).
3. *Model portfolio*: portfolio multi-period probability optimization can be run from a set of the investable opportunities. Out of the millions of potential asset allocations, the output takes the form of the effective “optimal portfolio” and the “top portfolios” (portfolios that are seemingly valid but slightly sub-optimal than the effective optimal one).
4. *Favorite investments*: the investment products that appear most regularly in all top portfolio allocations are identified. An iterative process, led by wealth managers, follows to reduce the optimization exercise to a more refined exercise where the universe of the initial favorable investment opportunities is customized to the client profile, for example, 40 products. From this more focused and manageable list of suitable investments, a wealth manager selects, for example, ten investments to recommend to clients.
5. *Must-have investments*: Given all real portfolios are associated with a particular client profile, a series of what-if simulations can be run to determine the impact of recommended changes to a client portfolio as part of a rebalancing exercise towards the optimal portfolio. These simulations include each and every one of the favorite products based on simple investment rules (for example, increase AUM by 20 percent or replace an existing product with a holding in one of the favorite products).

The output is a further refinement of the set of favorite products, where those that seem to bring more added-value to the individual client’s investments are flagged “must have” for such a client, for example, five investment opportunities out of the ten recommended.

6. *Advisory campaign targets*: All real portfolios can be screened centrally to determine those whose past performance and future potential show either a deterioration of the probability to reach the defined ambition target (that is, requiring advisor-to-client review, investment reallocation or redefinition of the time horizon) or very high probability of reaching the ambition (that is, creating the opportunity for client discussion and new investments). Wealth managers can therefore communicate to the advisors which client portfolios, out of the many options, are to be made a priority target for “advisory campaigns” aimed at achieving a better mix of risk-return characteristics.

Making the journey

1. *Advisory preparation*: Identify
 - the “advisory campaign targets”
 - the “favorite products” for the given client profile out of those selected by a product specialist
 - the “must have products” given the effective client portfolio

Simple what-if analysis (guided, but flexible, reallocation) and ex-ante comparison of ambition/risk probability among actual/what-if model portfolios (coupled with a stress test) allows wealth managers to create an optimization workflow that can be run centrally (for the elements requiring higher analytical skills and product selection competences) and deployed locally at advisors’ level (where client knowledge is predominant).

2. *Added-value client advisory*: Financial advisors can prepare customized investment proposals with a well-constructed story. This helps clients to understand the value of agreeing to embark on a rebalancing program to align their holdings with the desired optimal portfolio. Ultimately, this helps to ensure that, at the end of the journey, the clients arrive at their desired location. They achieve what they want in terms of capital sums and/or cash flows.

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