Return decomposing of absolute-performance multi-asset class portfolios

Working Paper - Nummer: 16

2007

by Dr. Stefan J. Illmer und Wolfgang Marty;

in: Financial Markets and Portfolio Management;

March 2007; Volume 21; Number 1;

page 121 – 134.

IIPC Illmer Investment Performance Consulting AG

Kontaktadresse
Illmer Investment Performance Consulting AG
Weinbergstrasse 28
CH – 8200 Schaffhausen
Email stefan.illmer@iipc-ag.com

Return decomposing of absolute-performance multi-asset class portfolios

Version as of 04.12.2006

By Dr. Stefan J. Illmer and Wolgang Marty

Abstract *The asset management industry is increasingly confronted with the investor's demand for absolute-performance portfolios. Beside the challenge to come up with appropriate investment strategies, asset managers also face the problem of explaining the achieved results, especially whether these results were due to luck or skill. This last problem is even more complex because the methods currently available for evaluating the performance of an asset manager are not appropriate for absolute-performance portfolios. This article addresses this problem and presents a practical solution, especially for absolute-performance multi-asset class portfolios.*

1. INTRODUCTION

Before we present our approach for decomposing the return of absolute-performance multi-asset class portfolios, it is essential to explain what we understand by the corresponding investment strategies as well as to discuss the assumptions underlying our argumentation.

Absolute-performance multi-asset class portfolios[1] do not follow the traditional investment strategy of relative-performance portfolios. In contrast to relative-performance portfolios, it is not the investment target to manage the portfolio against a pre-defined (long-term) benchmark replicating the investor's long-term liabilities. Absolute-performance portfolios have a short-term investment horizon and are managed against a (long-term) target return reflecting the required (periodical) interest on the investor's long-term liabilities. We focus on institutional investors or pension funds and do not address the specific case of private and retail investors.

We propose a practical approach for decomposing the return of absolute-performance portfolios that is motivated by our experience in pension fund consulting and reporting. The following assumptions are based on principles of the investment process and are necessary for the understanding of the argumentation pursued in this paper:

- Short-term risk aversion is more critical than the long-term risk profile. Although we know from theory that risk is paying off in the long term for absolute-oriented investors, short-term risk aversion is more relevant because the realized performance is usually measured and reported on a much shorter time scale than a typical long-term time horizon.

- In absolute-performance portfolio management, short-term market expectations are more relevant than long-term market expectations because a portfolio manager will never be fully invested in equities if he expects a crash in the near future, even though his long-term view might not be as gloomy.

- The asset manager has to take into account his own as well as the client's market expectations.

- The investor expresses his market expectations explicitly through his short-term expected market return and risk figures or at least implicitly through his short-term risk aversion, which may be mirrored by short-term or tactical investment guidelines.

- The basic principles of the risk-return trade-off remain valid and the asset manager acts accordingly - even if only intuitively.

- In addition to his own market expectations, the asset manager derives the optimal reference portfolio from the investment guidelines set by the investor and from the investor's short-term market expectations and short-term risk aversion.

The above-mentioned optimal reference portfolio is thus pre-defined and, as a consequence, can be considered as a benchmark. In comparison to the benchmark of a relative-performance portfolio, the benchmark of an absolute-performance portfolio is a short-term as opposed to a long-term benchmark and therefore need much more frequent rebalancing and adjustment.[2] The introduction of a short-term reference portfolio is the fundamental basis of our proposed method for decomposing the return of absolute-performance portfolios.

2. MAIN ISSUES WITH THE TRADITIONAL PERFORMANCE EVALUATION

Apart from the challenge to come up with appropriate investment strategies and to run absolute-performance portfolios, the asset manager faces the problem of explaining the achieved results to the client, especially whether these results were due to luck or skill. This last problem is even more complex because the quality of the asset manager in charge of an absolute-performance portfolio is not easy to evaluate assuming that:

- The currently available or traditional methods for decomposing returns are used.
- An (absolute) long-term return target is used as the benchmark.

Tables 1a and 1b illustrate the first issue by decomposing the return of an absolute-performance portfolio applying a traditional performance attribution approach. In our case, the return decomposition was carried out for a single period using the method proposed by Brinson, Hood & Beebower (1986). Supposing a benchmark target return of 0%, the total excess return of the sample portfolio is 1.10%. Following Brinson, Hood & Beebower, the excess return is split up and attributed to three different sources: the asset allocation effect, the stock picking effect and the interaction effect. Due to the fact that the benchmark is not defined by a specific investment strategy but by an absolute return target instead, the individual asset classes of the benchmark only enter with 0% weights into the calculation of the asset allocation effect. Therefore, the asset allocation effect is not the difference between the returns of the passive and the active investment strategy but the difference between the absolute return of the actual asset allocation of the portfolio and the absolute benchmark target return, which is 0% in our case.[3] The total asset allocation effect is then equal to the absolute return of the actual asset allocation and is thus 0.79%. As the asset class weights of the benchmark are 0%, it follows that good asset managers (with good market timing capabilities) cannot be identified in rising markets, and the same argument applies to unsuccessful asset managers in falling markets.

Asset Class	Benchmark Weight	Portfolio Weight	Benchmark or Index Return	Portfolio Return
Bonds EUR	0.00%	25.00%	2.00%	1.80%
Bonds USD	0.00%	10.00%	-0.60%	0.50%
Bonds JPY	0.00%	0.00%	-1.50%	0.00%
Total Bonds	**0.00%**	**35.00%**	**0.00%**	**1.43%**
Equities EUR	0.00%	30.00%	2.00%	2.30%
Equities USD	0.00%	30.00%	-0.60%	0.10%
Equities JPY	0.00%	5.00%	-1.50%	-2.50%
Total Equities	**0.00%**	**65.00%**	**0.00%**	**0.92%**
Total	**0.00%**	**100.00%**	**0.00%**	**1.10%**

Table 1a: *Traditional return decomposition for an absolute-performance portfolio*

Asset Class	Asset Allocation Effect	Stock Picking Effect	Interaction Effect	Total Effect
Bonds EUR	0.50%	0.00%	-0.05%	0.45%
Bonds USD	-0.06%	0.00%	0.11%	0.05%
Bonds JPY	0.00%	0.00%	0.00%	0.00%
Total Bonds	**0.44%**	**0.00%**	**0.06%**	**0.50%**
Equities EUR	0.60%	0.00%	0.09%	0.69%
Equities USD	-0.18%	0.00%	0.21%	0.03%
Equities JPY	-0.08%	0.00%	-0.05%	-0.13%
Total Equities	**0.35%**	**0.00%**	**0.25%**	**0.60%**
Total	**0.79%**	**0.00%**	**0.31%**	**1.10%**

Table 1b: *Traditional return decomposition for an absolute-performance portfolio*

The stock picking effect can only be measured for a specific asset class if the benchmark is also invested in this asset class. In other words, if the asset class weight for the benchmark is 0%, the stock picking effect is automatically 0% as well.[4] With all asset class weights of the benchmark being equal to 0%, the total stock picking effect for absolute-performance portfolios is also 0%. The asset class weights of the benchmark being 0% complicates the indentification of good asset managers (with good stock picking abilities). In comparison to the asset allocation effect, the stock picking quality can be assessed if the interaction effect is considered. Considering the interaction effect as the stock picking effect is reasonable because the formula for the interaction effect also contains the return differential on index or asset class level, but it is multiplied by the asset class weight of the acutal portfolio instead of the asset class weight of the benchmark.[5] In such a case, it is assumed that the interaction effect fully belongs to the stock picking effect. In summary, using a traditional approach for decomposing the return of absolute-performance portfolios is not appropriate because the asset manager's asset allocation abilities are not properly measured and, as a consequence, this may lead to misinterpretations and inadequate feedbacks into the investment process. The traditional approach does not satisfy the actual requirements as far as performance evaluation is concerned.

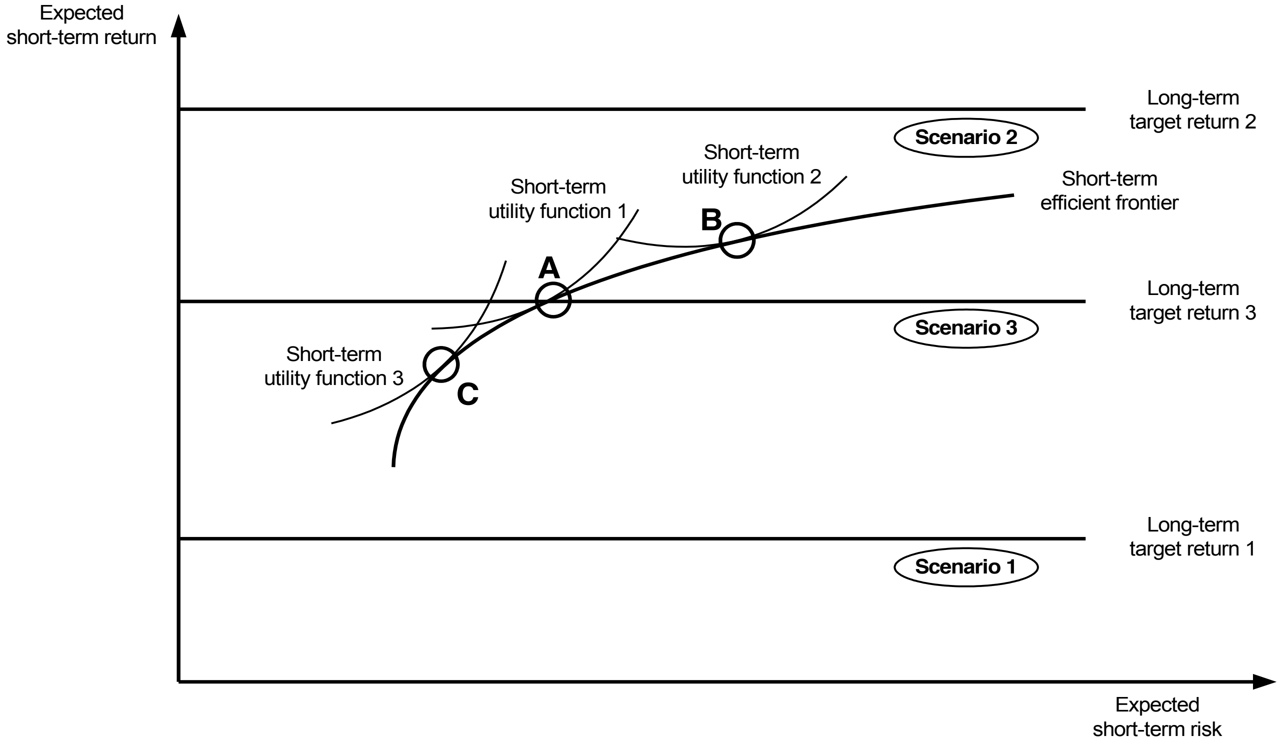

Figure 1: *Discrepancy between short and long-term return targets and possibilities*

As mentioned above, the second main issue in evaluating the quality of an asset manager of an absolute-performance portfolio is the use of an (absolute) long-term target return as a benchmark. Figure 1 illustrates this problem by showing three different scenarios in which a long-term target return could potentially be an unrealistic benchmark. We compare specific long-term target returns (illustrated by the straight lines) with the expected short-term returns of the portfolios on the short-term efficient frontier. For scenario 3, we also consider three different short-term utility functions related to a specific client.

In scenario 1, the required long-term target return 1 is lower than the expected return of any portfolio on the efficient frontier. From an ex-ante point of view, using the long-term target return 1 as a benchmark is not reasonable because achieving a positive excess return is possible without any risk considerations or by investing in risk-free assets only. In other words, on an ex-post basis, a positive excess return over the long-term target return 1 cannot be put down to the asset manager’s skill. The opposite argument applies to scenario 2, where the long-term target return 2 is substantially above the highest expected return of any portfolio on the efficient frontier. In this case, not even portfolios with a high level of risk have a positive expected excess return because every efficient frontier portfolio has a negative expected excess return. Additionally, using the long-term target return 2 as a benchmark is not reasonable in such a scenario from an ex-ante point of view because any efficient frontier portfolio has a lower expected return than the long-term target return. In other words, a negative ex-post excess return over the long-term target return 2 cannot be interpreted as an indication for poor asset management skills. In an environment where interest rates and expected market returns are on historically low levels, an asset manager faces a certain negative excess return for a short-term period even if he invests in highly risky portfolios. Considering the risk aversion of traditional, absolute-performance-oriented clients, a high degree of portfolio risk would not be appropriate and therefore, the long-term target return 2 would not be achievable. Compared to the other above-mentioned scenarios, we see in scenario 3 that, from an ex-ante point of view, the long-term target return 3 lies between the minimum and the maximum expected return of the efficient frontier portfolios. According to the efficient frontier concept, one uses the individual utility function of a client to represent his risk aversion and then chooses the optimal efficient frontier portfolio as the one that is tangent to the utility function. Assuming the short-term utility function 1, the long-term target return 3 would be identical to the expected return of the optimal efficient frontier portfolio A. In this unrealistic case, the long-term target return is equal to the expected return of the optimal efficient frontier portfolio, and the long-term target return 3 would be an appropriate benchmark. In all other cases (for example with the short-term utility functions 2 and 3 in our illustration), we are in situations similar to those described by scenario 1 and 2 discussed above. In case of utility function 2, the situation is the same as in scenario 1 with the expected return of the optimal efficient frontier portfolio B being higher than the long-term target return 3. As mentioned above, in this situation it is not clear whether the ex-post excess return is due to the asset manager's decisions or not. Applying utility function 3, the situation is the same as in scenario 2 and the expected return of the optimal efficient frontier portfolio C is lower than the long-term target return 3. As explained above, in this situation it is again not clear whether the excess return on an ex-post basis is due to the asset manager's decisions or not.

Following the above argumentation on the long-term target return, we can conclude that

- In general, a target return used as a benchmark does not necessarily reflect the client’s long-term attitude towards risk and the client’s long-term utility function.[6]
- A specific long-term target return related to an annual interest on liabilities should not be linked to the (short-term) risk aversion or to the (short-term) market expectations with respect to risk and returns.
- setting an unrealistic (short-term) target return from an ex-ante perspective may not be very motivating for the asset manager and may lead to unintended (short-term) risk.
- using an unrealistic (short-term) target return to assess the quality of an asset manager on an ex-post basis may lead to misinterpretations and inadequate appraisals and thus also to inadequate feedbacks into the investment process.

After discussing the two main issues an asset manager faces when explaining the achieved results of absolute-performance portfolios to a client, we can conclude that the assessment of the value added by an asset manager is not possible using a (long-term) target return as a benchmark and a traditional method to decompose returns. Based on the assumptions mentioned in the introduction, we are going to present a method for decomposing the return of absolute- performance multi-asset class portfolios.

3. DECISION-ORIENTED RETURN DECOMPOSITION

In order to decompose the returns of absolute-performance portfolios, we propose a decision-oriented approach consisting of following three steps (for more information on this decision-oriented framework see Illmer & Marty (2003):

Step 1: Transform the specific investment decisions into (absolute) asset allocations.

Step 2: Calculate the corresponding returns of the different asset allocations.

Step 3: Assign the returns as well as the return differences to the investment decisions and to the relevant decision makers.

Considering our assumptions described in the introduction, we define a general investment process for absolute-performance multi-asset class portfolios as illustrated in Figure 2. In our sample investment process, we identify the following five implicit or explicit investment decisions, with the asset manager being responsible for decisions 4 and 5 and the client being responsible for decisions 1 to 3 :

Decision 1: Define the (required) long-term target return as well as the risk profile of the client.

Decision 2: Define the short-term market expectations of the client and deduce the short-term efficient frontier.

Decision 3: Define the short-term risk aversion of the client and derive the short-term optimal efficient frontier portfolio and/or the short-term investment guidelines.

Decision 4: Define the daily market expectations of the asset manager and derive the daily efficient frontier.

Decision 5: Derive the daily optimal efficient frontier portfolio of the asset manager in line with the short-term risk aversion and the short-term investment guidelines of the client.

The first decision focuses on the required long-term target return, which may be based on the client's investment goal, for example the periodical interest necessary to serve the clients' liabilities. Contrary to a relative-performance portfolio, the second investment decision does not focus on long-term but on short-term market expectations. The length of the investment horizon may differ from client to client and will normally vary from one month to one year. Based on these short-term market expectations, it is possible to derive a short-term efficient frontier, which is then used in the third investment decision step to define the short-term optimal efficient frontier portfolio depending on the client's short-term risk aversion. Should an investor be unwilling or unable to formulate his own short-term market expectations, he can delegate this to a consultant or to the asset manager directly. In such a case, it is even more important that the delegates involve the client by regularly presenting their scenarios to him. The short-term optimal efficient frontier portfolio can be regarded as the short-term reference portfolio or – as we will call it in the following – as the short-term benchmark. Moreover, the expected return of this short-term benchmark can be referred to as the expected short-term target return for the next investment horizon because it reflects the expected return potential considering all investment constraints. In step 4, the asset manager derives the daily efficient frontier based on his daily market expectations as well as on the client's short-term investment guidelines.[7] Considering the short-term risk aversion of the client and not his own, the asset manager defines and implements the daily optimal efficient frontier portfolio in step five. It has to be emphasized that it should be the risk aversion of the client and not that of the asset manager that is always controlling. This is another difference between absolute- and relative-performance portfolios. The final and implemented portfolio leads to the historically realized return of the portfolio, which has to be assessed.

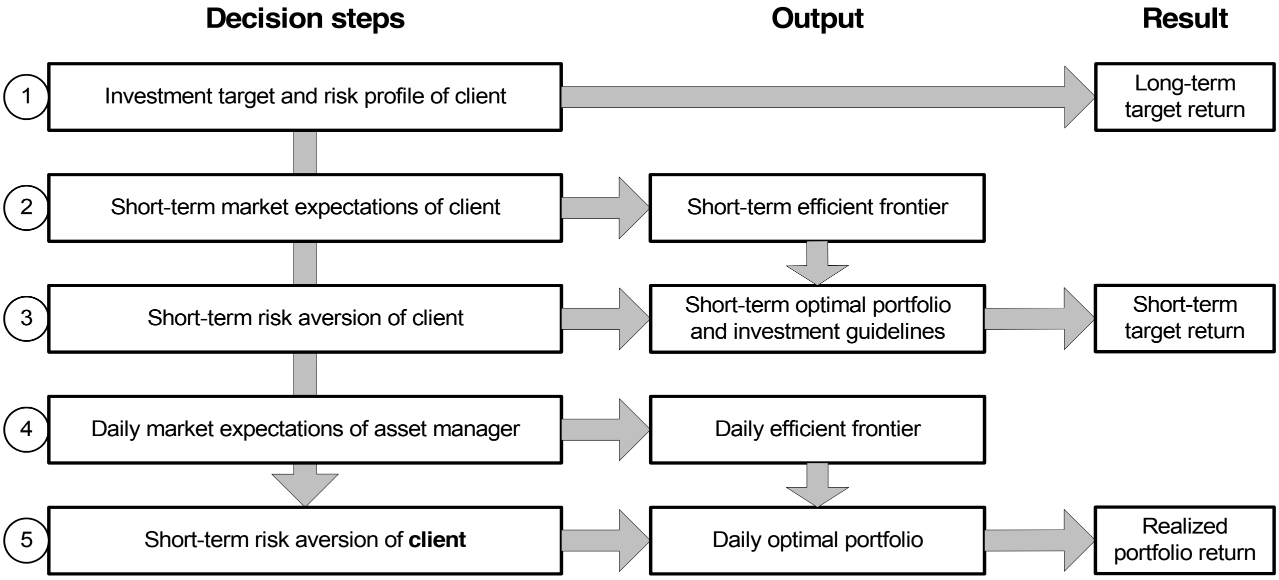

Figure 2: *General investment process of an absolute-performance portfolio*

In the second step of our proposed approach for a decision-oriented return decomposition, historical returns are calculated for the different (absolute) asset allocations as defined in the above mentioned investment decisions. In step 3 of the decomposition approach, we assign the returns as well as the return differences to the relevant investment decisions and decision makers identified in step 1.

Figure 3 illustrates the decomposition of the return of an absolute-performance portfolio based on the above-identified investment decisions. In addition, the client perspective is incorporated by not only decomposing the time-weighted rate of return (TWR) but also the money-weighted rate of return (MWR). From a general point of view, we argue that Figure 3 represents a comprehensive framework for decomposing the return of portfolios regardless of whether they are absolute- or relative-performance portfolios. This framework integrates three different perspectives: the overall client perspective focusing on the absolute portfolio return, the client's view focusing on the MWR of the portfolio relative to the long-term or short-term benchmark and the asset manager's view focusing on the TWR of the portfolio relative to the long-term or short-term benchmark (for more details on the decomposition of the MWR, see Illmer & Marty (2003)). Following the investment process shown in Figure 2, we can identify the following return differences which form the basis for the assessment of the asset manager and all other decision-makers involved.[8]

- **Expected excess return** is the difference between the long-term target return and the expected return of the (short-term) benchmark and shows whether the investment goal is achievable from an ex-ante perspective.
- **Estimation error** is the difference between the ex-post benchmark return and the expected (short-term) benchmark return and is an indication for the forecasting abilities.
- **Realized excess return** is the difference between the ex-post money-weighted rate of return of the portfolio (so-called client return) and the ex-post (short-term) benchmark return. It is an indication of the quality of all investment decisions (including the timing of external cash flows by the client). The ex-post money-weighted rate of return of the portfolio measures the return from the client perspective, it is therefore denoted as "client return" in Figure 3, distinguishing it more from the below-mentioned asset manager return.

- **Benchmark effect** is equal to the ex-post (short-term) benchmark return and can be viewed as the return contribution by the decision to invest the initial money into a specific (short-term) benchmark strategy.

- **Management effect** is the difference between the ex-post time-weighted rate of return of the portfolio and the ex-post (short-term) benchmark return and can be viewed as the return contribution by the active investment decisions of the portfolio manager, for instance on asset allocation or stock selection. The ex-post time-weighted rate of return of the portfolio measures the return from the asset manager's perspective and is therefore denoted in Figure 3 as “asset manager return”, distinguishing it more from the client return.

- **Timing effect** is the difference between the ex-post money-weighted rate of return of the portfolio and the ex-post time-weighted rate of return of the portfolio and can be viewed as the return contribution by the decision to change the amount of money invested in the benchmark strategy and in the active asset allocation of the portfolio.

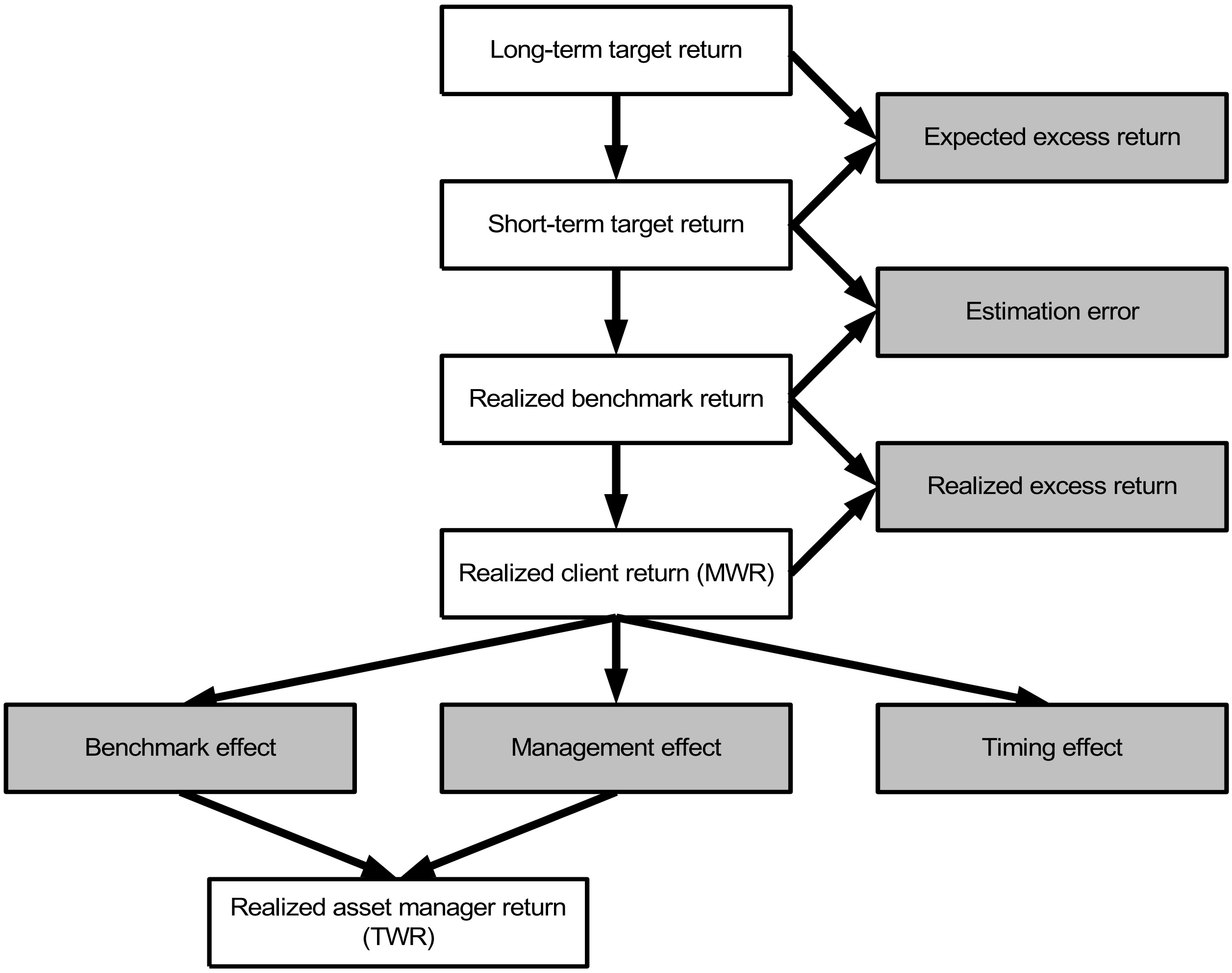

Figure 3: *Comprehensive framework for decomposing the return of portfolios*

4. Practical illustration of the proposed decomposition approach

The decomposition approach presented in this paper is applied to an absolute-performance portfolio of a Swiss Franc-based client as of the end of 2002. The underlying investment strategy follows an absolute-performance approach and invests in three asset classes, namely cash, bonds and equities. As reflected by the expected market returns in Table 2, the client had a very conservative risk profile and a very pessimistic market outlook for the upcoming year at the end of 2002, which was common at that date. Table 2 also includes the tactical investment guidelines as well as the realized market returns for 2003. Assuming a client's long-term target return to be 5% p.a., it was very unrealistic at the end of 2002 to expect to outperform or even to reach the absolute benchmark of 5%.

Asset class	Tactical guidelines		12 months expected returns in CHF as of 31.12.2002	12 months realized returns in CHF for 2003
	minimum	maximum		
Cash total	0.0%	41.0%		
Cash CHF	0.0%	29.0%	0.70%	0.32%
Cash non CHF	0.0%	14.5%	Euro 4.70% and USD -1.30%	Euro 10.13% and USD -9.48%
Bonds total	35.0%	70.5%		
Bonds CHF	35.0%	70.5%	0.70%	0.91%
Bonds non CHF	0.0%	17.5%	Euro 4.55% and USD -0.86%	Euro 11.79% and USD -8.53%
Equities total	0.0%	47.0%		
Equities CHF	0.0%	23.5%	5.20%	19.94%
Equities non CHF	0.0%	23.5%	3.81%	19.77%

Table 2: *Underlying market expectations and realized market returns for 2003*[9]

Based on the long-term target return, the conservative risk profile and the tactical investment guidelines of the client as well as the short-term market expectations, we compute the short-term efficient frontier presented in Figure 4.[10] We note that, due to the restrictions in the optimization process, the efficient frontier is below the return of some market indices like the Euro money market index (Citigroup 3mo Euro EuroDep) and the Euro bond index (Citigroup EMU 1+ Yr Gvt). Similarly, the optimization does not fully invest in the Swiss equity indices (MSCI Switzerland and the MSCI World) because, apparently, these markets do not have an optimal risk-return relationship in the optimization framework. For the impact of constraints on a portfolio optimization problem, we refer to the example in Vörös (1987). As indicated in Figure 4, the client did not choose one of the efficient frontier portfolios but a non-efficient portfolio which suited the client specific circumstances better than the reference portfolio or the short-term benchmark. From an ex-ante point of view at the end of 2002, the short-term benchmark had an expected 12-month return of +1.56%. Therefore, the expected excess return was -3.44%, which corresponds to scenario 2 illustrated in Figure 1. As we know today, the markets performed considerably better in 2003 than expected by many investors, resulting in a short-term benchmark calendar year return of +4.70% and in an estimation error of +3.14% for 2003. Assuming that the asset manager generated an absolute return of +6.15 %, we calculate a realized excess return of +1.45% for 2003, which is attributed to the asset manager due to the absence of cash in- and outflows from the client. Figure 5 illustrates the process of determining the different portfolios as well as the corresponding returns.

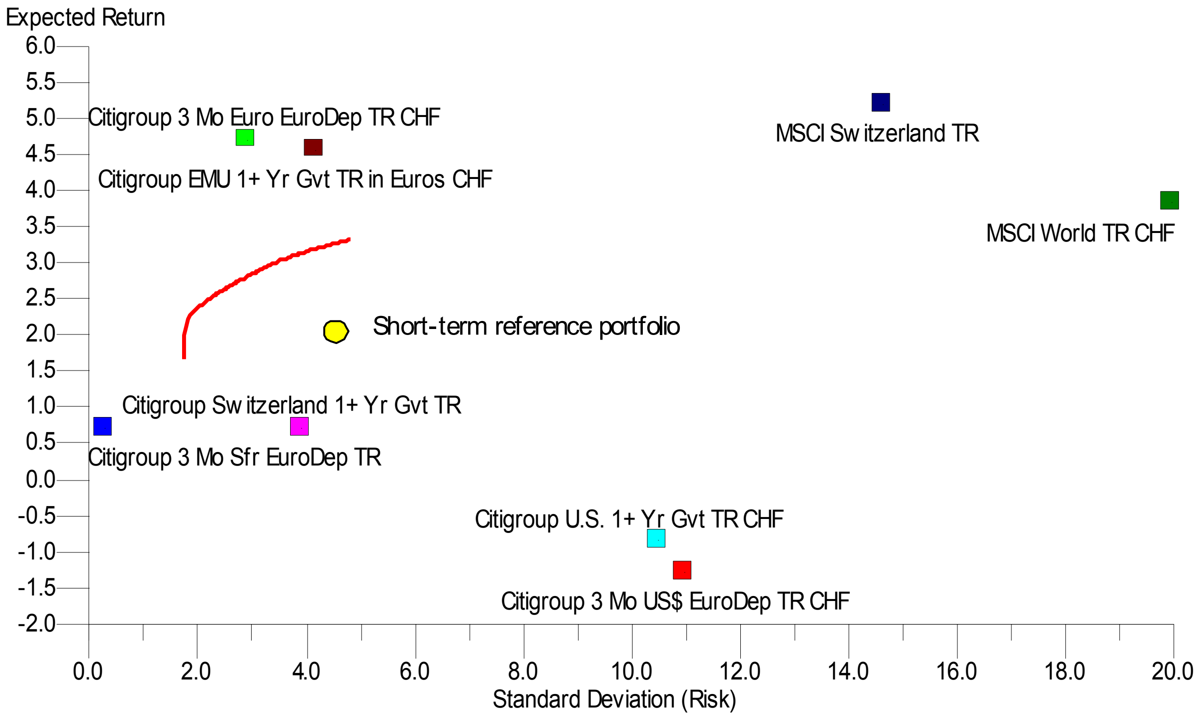

Figure 4: *Short-term efficient frontier*

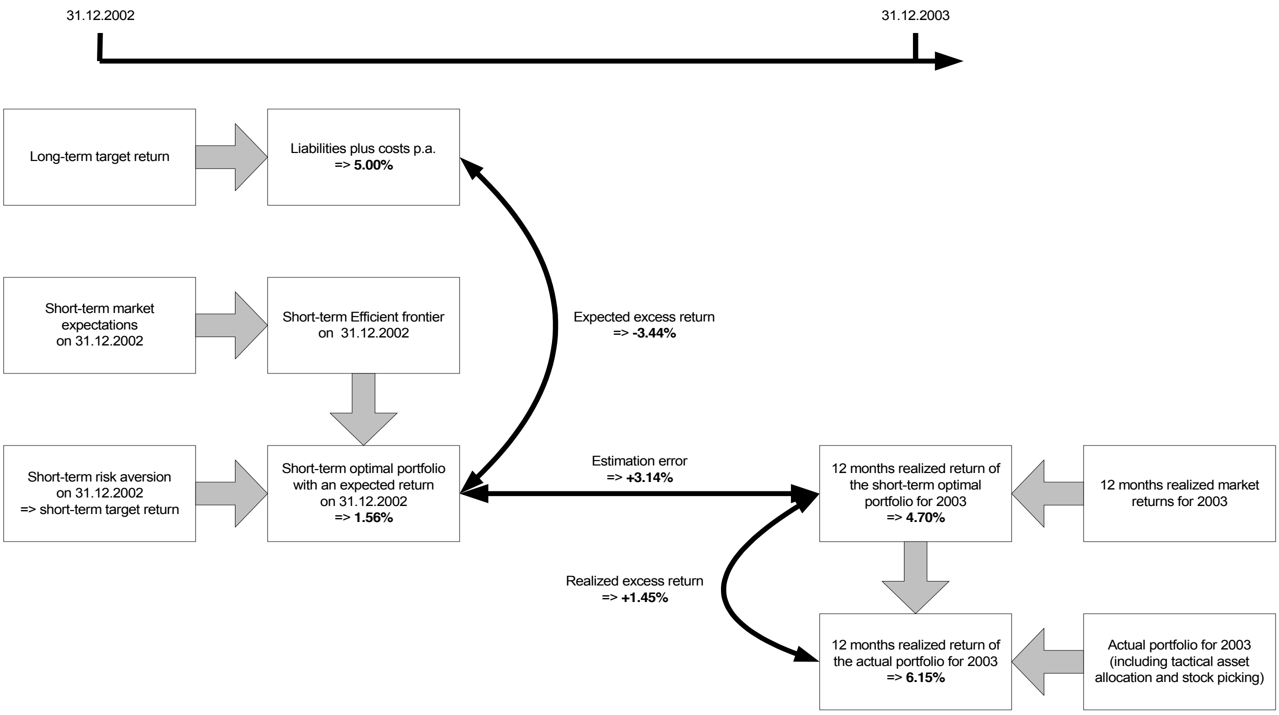

Figure 5: *Investment process and return decomposition over time*

5. SUMMARY AND CONCLUSIONS

We have presented evidence that the traditional decomposition approach leads to dissatisfying results and misinterpretations when applied to absolute-performance portfolios. Without an alternative approach for evaluating the performance of an asset manager, it is not possible to conclude whether the absolute return is due to skill or luck. Not using a short-term benchmark would imply that one never looks back at one's own past market expectations. Our approach for decomposing the return of absolute-performance portfolios allows not only to quantify the value added by the different decision makers but, more importantly, also makes the investor more aware of the - additional and may be unintended – investment risk he faces when the long-term target return cannot be achieved in the short-term. In summary, we conclude that we cannot avoid the benchmark concept for absolute-performance portfolios. This last statement might be controversial but may invite those who disagree to present an alternative approach for the return decomposition of absolute-performance multi-asset class portfolios.

Acknowledgements

We would like to thank the anonymous referees as well as Marcel Roost from Credit Suisse for their valuable comments and discussion points.

References

Brinson, G., Hood, R. and Beebower, G.: Determinants of Portfolio Performance. Financial Analysts Journal, 42(4), 39-44 (1986)

Brinson, G., Singer, B. and Beebower, G.: Determinants of Portfolio Preference II: An Update. Financial Analysts Journal, 47(3), 40-48 (1991)

Illmer, S. and Marty, W.: Decomposing the Money-Weighted Rate of Return. Journal of Performance Measurement, Summer, 42-50 (2003)

Vörös, J.: The explicit derivation of the efficient portfolio frontier in the case of degeneracy and general singularity. European Journal of Operational Research, 32, 302-310 (1987)

Endnotes

[1] In the following, we abbreviate the term "absolute-performance multi-asset class portfolios" with "absolute-performance portfolios" and "relative-performance multi-asset class portfolios" with "relative-performance portfolios".

[2] The higher rebalancing or adjustment frequency implies a larger effort in managing an absolute-performance portfolio because market expectations and risk aversion have to be surveyed more often. At first sight, this can be understood as an advantage of absolute-performance portfolios because, ideally, the higher rebalancing frequency is also connected with more client contact. In contrast to this, the asset manager of a relative-performance portfolio normally communicates rather rarely with the client because both orientate themselves

at long-term parameters such as long-term risk and return expectations. On the other hand, varying market expectations and risk aversions in the short-term can be observed with some clients and often lead to discrepancies between short- and long-term views, which are very difficult to agree upon. This also implies higher transaction costs, which have a negative impact on the return of the portfolio.

3 The formula for calculating the asset allocation effect (A_i) for a specific asset class i is: $A_i = (w_i - W_i) * b_i$, where w_i is the portfolio weight of asset class i, W_i is the benchmark weight of asset class i and b_i is the index return of asset class.

4 The formula for calculating the stock picking effect (S_i) for a specific asset class i is: $S_i = (r_i - b_i) * W_i$, where r_i is the portfolio return of asset class i and the other variables denote the same as above.

5 The formula for calculating the interaction effect (I_i) for a specific asset class i is: $I_i = (w_i - W_i) * (r_i - b_i)$.

6 Another inherent problem of absolute-performance portfolios worthwhile mentioning is the mismatch of the length of the different relevant investment horizons. The long-term target return is related to the long-term liabilities and therefore implies a long-term investment horizon which may be several years long. On the other hand, the absolute-performance portfolio is driven by short-term market expectations and therefore has a short-term investment horizon. In addition, the asset manager of an absolute-performance portfolio may be forced to trade actively and may have a daily focus and therefore a daily investment horizon. Comparing benchmarks or target returns which are based on different investment horizons is not reasonable and leads to the above-mentioned issues when evaluating the quality of the asset manager and all other decision-makers in the whole investment process – including the consultant or even the client.

7 The investment horizon of the asset manager may differ from one day but, for simplicity, we choose a daily investment horizon to distinguish it from the client’s investment horizon.

8 According to other underlying decisions like asset allocation or stock picking, the return differences can be further split up according to, for example, asset classes or sectors. However, this is not illustrated in this article. The further decomposition of the MWR was discussed in a presentation “Decomposing Money-Weighted Rate of Return” held by Dr. Stefan J. Illmer at the Performance Attribution Risk Management 11th Annual in London in 2003. The presentation is available from the authors.

9 We assume an expected currency return of 1.6% for CHF/EUR and of -2.8% for CHF/USD in 2002, the realized currency returns in 2003 being 7.5% for CHF/EUR and -10.5% for CHF/USD.

10 The risk expectations are not shown but correspond to the historical five year covariance matrix of the underlying market indices.