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PROFILE – OPTIMISE – COMPLY

Strategic Asset versus Risk-Return Allocation Strategies

Lessons from a Financial Crisis

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Abstract

The Strategic/Tactical Asset Allocation Paradigm is naturally related to Modern Portfolio Theory. The recent global financial crisis has emphasized the instability and severity of risks during turbulent market times. As investors care about extreme risks, it is necessary to re-think portfolio management systems in accordance with their risk perception and risk aversion. We propose a new paradigm in which the manager sets a long term strategic risk-return target trade-off with tight risk limits, but very flexible asset allocation constraints. The implementation of this new system, called the strategic global risk-return allocation, is tested live with the Optimized Dynamic Portfolio (ODP), run by Smart Private Managers with the use of the FolioMaster optimization software of Gambit Financial Solutions. The portfolio backtesting shows that the objective of controlling the portfolio risk level is fully achieved. Tactical moves to seize favorable risk-return opportunities are made possible through aggressive portfolio rebalancing. As a result, ODP captures the increase of financial markets but limits its downside risk exposure at times of crises, thereby keeping risk lower than the one of equity markets.

A Case for the Longevity of Strategic/Tactical Asset Allocation Strategies

Since the birth of modern portfolio theory, more than a half-century ago, asset allocation decisions for long-term diversified portfolio purposes have typically obeyed a hierarchical framework. High-level strategic allocation decisions drive the durable balance between asset classes, sectors, or geographical regions to be represented in the portfolio. These fundamental choices of weights are driven by the long-term expected returns. Then, in the implementation phase, the manager is given more or less freedom to alter the target weights on the basis of short- and medium-term considerations, within a certain tolerance and up to a certain level of granularity. The success of these tactical moves reveals the manager's skills and luck.

The articulation between strategic and tactical allocation naturally belongs to all human activities that involve interactions and confrontations, from military actions to mind sports. To comply with the investor's objectives and constraints, the portfolio manager must cope with a changing, sometimes hostile economic and financial environment, which explains the parallelism drawn with strategy and tactics. Indeed, the alternative approaches to portfolio management based on dynamic asset allocation strategies most often apply as an overlay to the global portfolio rather than as a substitute to the strategic-tactical management context, as evidenced for instance with core-satellite portfolios.

It is legitimate to wonder why the strategic allocation framework with target weights for different asset classes has remained dominant for such a long time. The reason is to be found in the roots of modern portfolio theory. Investors are considered as rational risk averters, and "risk" in this context is measured by reference to variation around expected returns, reflected by the variance or its squared root and the standard deviation (a.k.a. volatility of returns). The Capital Asset Pricing Model (CAPM) has further characterized the asset risk-return relationship in an equilibrium setup. Subsequently, most factor models such as the Arbitrage Pricing Theory or the Empirical CAPM, still largely in use nowadays, have provided with refined estimates of expected returns and factor sensitivities. Yet, they have not really rejected the principle of a positive, linear relationship between the expected returns of financial assets and their volatility. In other terms, the long term expected return of asset classes and their variance and covariances basically reflect the same kind of information. Taking a view on the weighting of asset classes for strategic allocation makes sense, as deciding it simultaneously sets the risk limits. The reliability of asset classes as risk predictors in the context of modern portfolio theory explains the longevity of strategic/tactical allocation schemes.

Since the mid fifties, the market conditions had not really endangered this paradigm. This is because extreme risks (which are rare by nature), which is a clear threat for the strategic allocation framework, did not materialize. The global crisis that burst in 2007 has suddenly shown the dramatic limits of this line of thought. New and relevant issues are calling for new solutions. They can take the form of adjustments to the existing solutions, or they can propose a new line of thought. We adopt the second point of view, and develop in this paper the notion of global strategic risk-return allocation as an alternative to strategic/tactical asset allocation schemes.

The Breakout from the Financial Crisis

The financial crisis that shook the world in 2007-08 has concomitantly evidenced two breaches in the strategic allocation paradigm whose complementary effects call for a strong review of its applicability: the lack of reliability of the diversification effect in times of market turmoil, and the relevance of capital protection as a substitute for limited volatility for rational investors.

The illusion of diversification

Before 2008, notions such as asymmetry or fat-tailedness of returns distributions were commonly considered as too sophisticated and practically marginal to be implemented in most asset allocation schemes. This apparent negligence was not irrational. Indeed throughout the post-World War II period, extremely adverse conditions on financial markets were sufficiently rare. Hence, for a sufficiently long horizon and in a well-diversified portfolio, accidents could be diversified away. Returns skewness (i.e. asymmetry) and kurtosis (i.e. fat-tailedness) could matter for individual securities, but became marginal issues at the global portfolio level. The best instance of such a behavior was the inclusion of alternative investments in portfolio allocations. This particular universe of assets was characterized by low variance, but high tail risks. Provided that bad surprises such as frauds, blowups or wrong leveraged bets occurred in isolation and on a random basis, this characteristic was not forestalling in a balanced asset allocation and a fraction of the portfolio could be reserved for these investment classes.

In fact, the issue of tail risk becomes relevant when it develops a macro risk through the phenomenon of "global correlations". As shown by Bhansali (2008), turbulent market conditions could lead to a reinforcement of cross-correlations between or among asset classes affected by liquidity issues. Portfolios composed with securities that are seemingly remotely dependent from each other may appear to be well-diversified. But if this dependence suddenly increases for very negative returns, the very purpose of diversification fades away, as the portfolio provides no downside protection.

This phenomenon, which used to be fairly theoretical, erupted during the crisis. The unusual market conditions triggered by the subprime crisis lead to a pervasive and significant increase in the sensitivity of most asset classes to common factor. What used to be well-diversified became "*diworsified*" portfolios, whose risk exposures suddenly concentrated at the worst moment.

The deception of volatility

The widespread use of variance as a risk measure does not properly mirror the type of portfolio risk that investors care about. Many individual and institutional investors have felt betrayed by the return properties of their portfolios in the crisis period. This is not so much because of the materialization of volatility risk, but because some have perceived that they were much more sensitive to "tail risk" than they thought, and their disutility consecutive to the severe portfolio drops experienced in Fall 2008 exceeds to a large extent a simple multiple of the returns standard deviations.

In many "MiFID-compliant" investor profiling systems, identifying reluctance to extreme risks would lead to diagnosing a high level of risk aversion. In turn, under the strategic portfolio allocation paradigm, the target portfolio allocation would be biased towards a basket of very defensive assets. Not only would this deceive the advisory mandate given by the investor, but it could be seen as a managerial mistake, since more aggressive portfolios naturally produce higher fees, a too conservative advice would unduly cut a source of revenues.

For an institutional investor with exactly the same profile, the portfolio solution would have been essentially different. To address the investor's concern for tail risk, some kind of portfolio insurance can be provided with a put option hedge overlay. Eligible solutions feature Constant Proportion Portfolio Insurance (CPPI), Option-Based Portfolio Insurance (OBPI) or sophisticated dynamic portfolio rebalancing schemes based on the control of

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"Our approach rests on the twin calibration of the investor's risk perception and of his preferences towards risk and return. These two elements are reflected in the parameters of a utility function that represents the optimization program for an investor."

drawdown risk. Such approaches create some positive convexity in the portfolio returns so as to protect capital or income, but cannot be considered as "defensive" as they preserve a large potential for fluctuations beyond the protection level. These approaches can meet the capital or income protection criterion, but as a drawback they are also very much restricted to addressing this type of risk avoidance: they cannot merely replace strategic asset allocation systems for investors with alternative views on risk.

Consider the following situation. Two investors wish a portfolio providing a 33% exposure to some equity benchmark. The first one has no particular reluctance to the possibility of a sharp decrease in the benchmark. A simple allocation 33% benchmark – 67% cash would be satisfactory. The second one prefers to have a level of capital protection. In his perception of risk, the benchmark is three times riskier than a closed-end guaranteed capital fund on the same benchmark that would provide a protection of 115% of the invested capital. The cost of this protection (essentially a put option) would be offset by the sale of a call option for 230% of the capital, thereby creating a collar, as shown in the next figure.

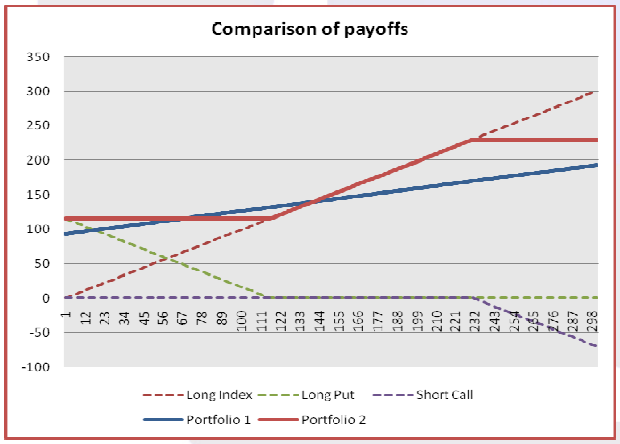


Figure 1
Comparison of payoffs between Portfolio 1 (linear mix 33% index – 67% cash) and Portfolio 2 (collar on the index)

These dichotomous points of view towards risk do not affect the investors' risk aversion level: they both want to bear one third of the risk of their common benchmark, but disagree of how to measure this relative risk exposure. Indeed, using a time series of an equity index during the 1998-2008 period (including the crisis), the pattern of monthly returns displays expected characteristics for both portfolios: Portfolio 1 has low volatility but suffers from the stock market crash as it provides no specific protection. Portfolio 2 features virtually the same volatility as the index, but provides some downside protection thanks to the protective put.

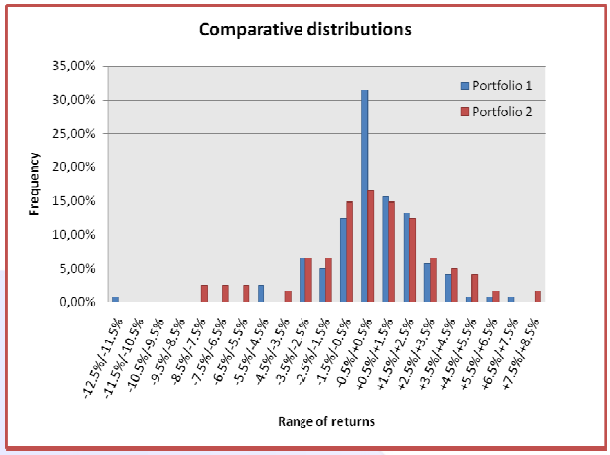


Figure 2
Comparative distributions (histograms) of monthly returns

The basic risk measures of these two portfolios perfectly illustrate their differences (see Table 1). Thanks to its negative leverage, Portfolio 1 has a lower volatility than the index, but shares the same unfavorable negative asymmetry and large fat-tailedness coefficients (resp. skewness and kurtosis). Portfolio 2 is more volatile, but benefits from the truncation of the tails through the options.

	Index	Portfolio 1	Portfolio 2
St. Dev.	7,08%	2,34%	3,14%
Skewness	-1,26	-1,24	-0,44
Kurtosis	7,33	7,27	0,92
VaR(Gaussian)	16,47%	5,44%	7,30%
MVaR	26,34%	8,70%	8,06%

Table 1
Basic risk measures for both portfolios

The last two lines of the table provide a direct and intuitive consequence of these differences: even though the Gaussian Value-at-Risk (at a 99% confidence level) of Portfolio 1 appears more favorable, taking into account the skewness and kurtosis through the Modified Value-at-Risk (MVaR) reverses the ordering. As this measure reflects a notion of extreme risk, Portfolio 2 has indeed been less risky, although more volatile, during this period.

As illustrated by this simple example, the notion of risk perception has become salient in the context of the crisis. No portfolio manager can ignore anymore the relevance of the investor-specific trade-off between the notions of protection and stability. We view the deceiving interpretation of volatility as the single measure of total risk for financial investors as the second major flaw of traditional applications of modern portfolio theory in the context of the crisis.

Consequences for post-modern portfolio theory

There is not a single paradigm, but a variety that could make up for the shortcomings of standard asset allocation schemes. Notwithstanding their relative merits, they must all provide a satisfactory response to the issues of correlations and extreme risks.

New asset allocation standards should at least recognize the fallacy of hypothesizing stationary return patterns with constant correlations and negligible extreme risks. For instance, one can keep the same approach and try to identify "the perfect hedge", i.e. an asset class that could enter the strategic allocation framework as a cushion against extreme correlations and tail risk. Another approach is to build bottom-up portfolios whose individual building blocks combine to respect certain diversification properties, controlling for the additional exposure brought by each additional block. Core-satellite portfolio management could also represent a response to the challenges of tail correlations and risks, as the satellite portfolio – instead of solely attempting to bring alpha to the fund – could serve as a dynamic buffer to control for beta exposures and reduce the risk of extreme negative returns.

The approach that we advocate below takes a different stance. ***Instead of sticking to a target allocation of asset classes (either top-down, bottom-up or core-satellite), we reverse the asset allocation problem and deliberately focus the portfolio strategy on risk allocations.***

The Principle of Strategic Global Risk-Return Allocation

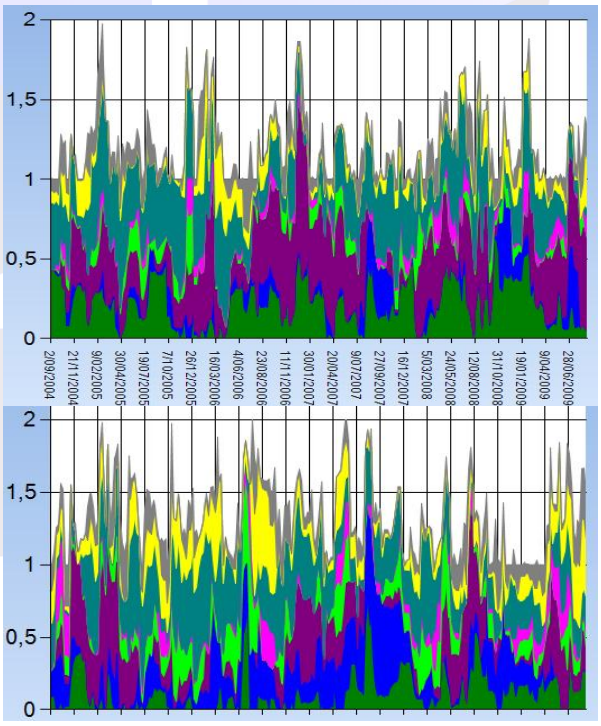
The strategic global risk-return allocation framework is a top-down approach, where decisions upon asset classes are replaced by a target behavior of portfolio risk. It entirely focuses on the control of risk, through a clear identification of the types of risk to be considered and the desired level of trade-off between risk and return. The tactical aspects of this framework are met through arbitrages between risk and return depending on the perceived market environment. Allocation to asset classes and individual securities are secondary – they only enter the framework through constraints on maximum holdings and rotation. Nevertheless, asset selection is still permitted and very important in this framework as this is where the skills of the portfolio manager can be magnified.

The framework provides specific responses to the treatment risk issues raised by the crisis.

Time-varying sensitivities and risk dependences

As asset classes display time-varying correlations with each other, with spikes in times of market stress, active portfolios that bear an exposure to these asset classes – that is, the vast majority of mutual and hedge funds naturally share and sometimes reinforce this characteristic, even though many of them maintain a quite sticky asset allocation. Furthermore, their total risk exposure can vary over time because of the various ways that they can influence their leverage: through gearing, derivatives exposure, long-short positions or simply by changing the beta of their underlying investments.

As an example of this instability, we show below the outcome of the style analysis performed on two funds that announce similar strategic asset allocations and similar benchmarks. We have modified the original setup proposed by Sharpe (1992), in which the constant betas to a fixed set traded indexes are supposed to add up to one, in three ways: (i) the possible use of leverage (sum of betas ≥ 1), (ii) making the betas time-varying through the use of the Kalman filter approach as in Posthuma and van der Sluis (2005) and Swinkels and van der Sluis (2006), and (iii) the stepwise selection of indexes (so that the set does not stay constant over time).



Source: GAMBIT Financial Solutions S.A.

Figure 3
Time-varying exposures of two funds with similar strategies (each style index is represented with identical colors)

The Kalman filter approach, that enables the betas to vary over time, is a very powerful way to identify unstable risk exposures. Here, we can not only safely conclude that the funds are not a substitute of each other, but also that they guarantee neither a stable level nor a stable evolution of risk exposures.

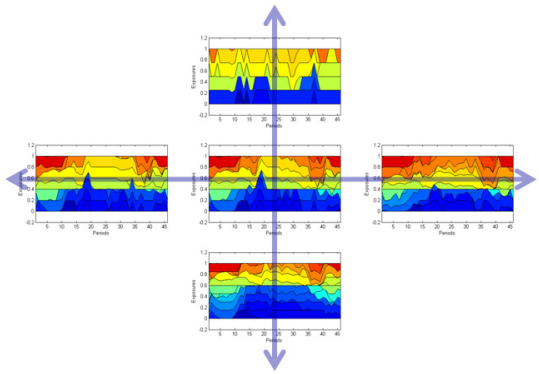
Amongst all methods based on historical time series of returns, the Kalman filter is one of the most reactive techniques to reflect variations in risk exposures. Nevertheless, this econometric approach is necessary but not sufficient to properly address the challenge of tail risk dependence. It has to be combined with the account for the impact of each individual security on the measures of the portfolio exposures to extreme risks. We have already mentioned a possible way to estimate this risk: through the portfolio skewness and kurtosis (the so-called "higher moments" of portfolio returns), which are themselves the product of all the co-skewness and co-kurtosis of each individual line in the position. Thanks to the fact that the time-varying portfolio exposures are reflected through their betas and that extreme risks are represented by the asset higher moments and co-moments, we have a reasonable response to the challenge of properly measuring the risk contribution of each position.

Investor's preferences for risk

The cornerstone of the strategic global risk-return allocation framework is the proper understanding of the investor's risk and return objectives throughout the portfolio. Usually, this task is considered as peripheral and the allocation uses a target maximum volatility, a VaR or a drawdown level as the risk budget. This choice has two implications that are inconsistent with our framework: it assumes a "one size fits it all" measure of risk, and it shuts the way to tactical decisions that could lead, for instance, to a temporary increase in risk to benefit from high return opportunities.

Our approach rests on the twin calibration of the investor's risk perception and of his preferences towards risk and return. These two elements are reflected in the parameters of a utility function that represents the optimization program for an investor. The two-dimensional risk perception–risk aversion map can represent a variety of profiles. However the most relevant ones, for portfolio allocation decisions, are the most contrasted ones on each dimension. The "protective" and "stable" investors dichotomize risk perceptions for a median level of risk, while the "dynamic" and "defensive" investors represent the (more traditional) behaviors of a very strong and very weak level of tolerance towards risk, respectively.

Using a large set of indexes, including alternative investments, we have applied this approach to determine the evolution of optimal portfolio holdings over time (with constraints on maximal exposure per asset class) for five investor profiles, as illustrated in the next figure.



Source: GAMBIT Financial Solutions S.A.

Figure 4
Evolution of optimal allocations for different levels of risk perception (horizontal axis) and aversion (vertical axis)

The middle left and right graphs represent the optimal allocations for a protective and a stable investor, respectively. They clearly show a difference in the dominant allocation: the allocation for the stable investor features more alternative investments, represented by the orange area, than for the protective investor. This is a natural consequence of the fact that most hedge fund indexes feature a low volatility, but a fairly high tail risk: they are better suited for investors who primarily care about the stability of their returns. But the graphs also show that, although all allocations have a cap on asset classes, there are significant variations in the optimal portfolio composition within each profile. This phenomenon illustrates that a global risk-return allocation framework does not accommodate tight bands for asset class allocations.

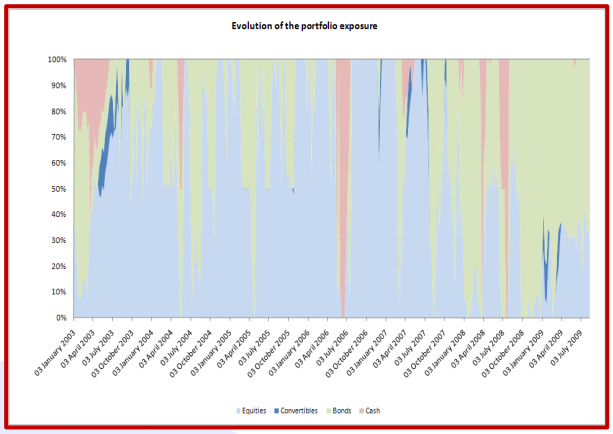
Indeed, setting bounds for asset allocations could become a significant hindrance for the implementation of the principles set forth in the strategic global risk-return allocation framework. As it can be seen in the figure above, the upper bound is often hit for all five profiles. To comply with the global risk-return objective, it is necessary to let the allocations fluctuate much more dynamically. This next step in the process has been implemented in an actually managed portfolio, the "Optimal Dynamic Portfolio", as described in the next section.

An Application: Smart's Optimized Dynamic Portfolio (ODP)

The practical implementation of a global risk-return asset allocation framework in a real-life context appears to avoid one issue in traditional portfolio management (instability of risk exposures by sticky allocations by asset classes) by falling in another trap, namely erratic portfolio rebalancing. In order to assess the relevance and seriousness of this potential drawback, we have applied the principles of strategic global risk-return allocation to a real portfolio, called "Optimized Dynamic Portfolio (ODP), managed by Smart Private Managers (Luxembourg), which selects the assets entering the portfolio, and under our guidance for the quantitative optimization aspects.

The ODP fund uses a portfolio optimization system called FolioMaster provided by Gambit Financial Solutions (Belgium) and applies a dynamic investor profile with a median risk perception, mixing stability and protection objectives in the definition of risk. The fund aims at realizing a quite aggressive risk-return trade-off, in the neighborhood of 70% of the risk of a full equity portfolio as considered by this type of investor. We have set no limits to the minimal or maximal composition of the equity asset class, and loose to cash investments. In order to limit the erratic behavior of the fund's allocations, we imposed an asset turnover constraint on the portfolio holdings. The expected return for each asset is assessed using a short-lived exponential moving average, i.e. the fund is momentum-driven. Finally, to cut tail risk, we impose a strict limit to the Modified Value-at-Risk of each allocation. The fund started live on December 31, 2008, and its composition is rebalanced on a weekly basis.

We performed a backtesting of these optimization principles since 2003. The following graph reports the evolution of the asset allocation of the portfolio.



Source: SMART Private Managers, GAMBIT Financial Solutions S.A.

Figure 5
Evolution of the ODP allocation by asset class – 2003-2009

As expected from the optimization principles, the composition changes radically over time. This system cannot stand any reasonable strategic asset allocation framework, but is fully compliant with our risk-return tradeoff approach. Even though the portfolio achieves the equity risk targeted by the allocation, it displays a very large dispersion of allocations, as shown in the table below.

	Equities	Convert.	Bonds	Cash
Average	57%	1%	36%	6%
Minimum	0%	0%	0%	0%
Maximum	100%	15%	100%	100%

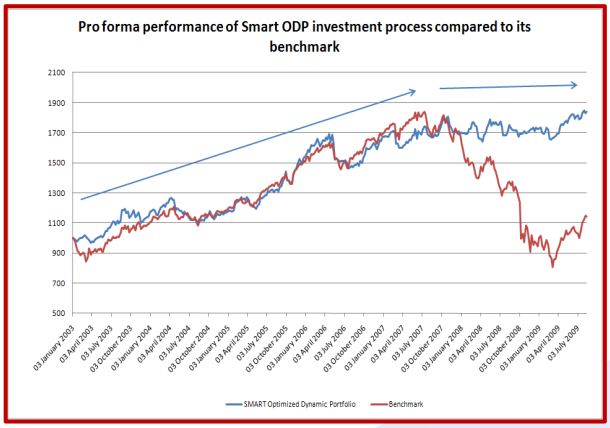
Source: SMART Private Managers, GAMBIT Financial Solutions S.A.

Table 2
Range of ODP allocations per asset class

This method has proven to be very effective. The purpose of the optimization (of expected utility) with risk and turnover constraints is primarily to deliver the same risk-return trade-off as a risk benchmark by overweighting equities in stable times and getting rid of global correlations in turbulent times, such as in 2008. The outcome from the backtesting, and the returns obtained to date in 2009, confirm that this is an achievable objective. The performance of the fund is compared to a composite portfolio, even though it cannot be interpreted as the fund's "benchmark" in the classical sense – the definition of an asset-based benchmark would deny the managerial focus on risk control rather than a target asset allocation. The results are summarized in the figure and table below.

"The FolioMaster optimization tools provided by Gambit allowed the ODP fund to truncate the losses, while the average risk exposure remains in line with the strategic target."

"Any method that would – deliberately or not – fail to account for the global correlation of assets and for the tail risk exposure would represent a danger for the investor, and in turn for his adviser."



Source: SMART Private Managers & GAMBIT Financial Solutions S.A., pro forma performance from January 2003 to August 2009 using the optimal allocation model excluding transaction, administration and management costs.

Figure 6
Evolution of the ODP allocation by asset class – 2003-2009

	Smart ODP	Benchmark
Return 2003	14.28%	9.08%
Return 2004	2.94%	9.06%
Return 2005	30.99%	26.79%
Return 2006	8.64%	12.31%
Return 2007	1.37%	-0.72%
Return 2008	1.74%	-43.77%
Average Return	**10.33%**	**3.98%**
Volatility (yearly)	**11.19%**	**19.11%**
Max Drawdown	**-13.68%**	**-56.10%**

Source: SMART Private Managers, GAMBIT Financial Solutions S.A.

Table 3
Risk and return characteristics of ODP and its reference portfolio ("benchmark")

Consistent with the risk profile of the fund, ODP does not always fully capture the upside from the equity market, as in this case it keeps a risk exposure which stays below the one of the reference portfolio. The tight risk management bounds and the reactivity of the optimization allow the fund to truncate the losses, while the average risk exposure remains in line with the strategic target. This story continues for 2009, where the fund obtains (year-to-date) a net return of 7.4% with a maximum drawdown of 1% since its launch: again, the performance is lower than the pure equity portfolio but the fund has truncated its tail risk during the February-March period.

Concluding Remarks

We propose an alternative framework to strategic allocation schemes per asset classes featuring tactical asset allocation decisions. The process is essentially similar, since the portfolio manager needs to set clear long-term guidelines (a red wire), and he has the possibility to depart from this target by seizing risk/return opportunities. The difference that we have introduced is on the object of the strategic decision. We consider the investor's views on risk perception and risk as the cornerstone of the process, and we allocate the portfolio risk-return tradeoff accordingly.

We have already stressed that our quantitative approach is not meant to replace the Asset Managers' market knowledge nor the other solutions that adequately meet the two main challenges created by the financial crisis, namely global correlation and tail risk exposure. Nevertheless our standpoint for the future is extremely clear for the broader issue of strategic portfolio management: any method that would – deliberately or not – fail to account for these two challenges would represent a danger for the investor, and in turn for his adviser. The "once-in-a-century-crisis" argument is fundamentally flawed in this context: other crises will erupt, other bubbles will burst, with different causes and on different asset classes but with fundamentally analogous impacts on portfolio risk exposures and performance.

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