Constructing Absolute Return Funds with ETFs: 
A Dynamic Risk-Budgeting Approach

July 2008

Noël Amenc
Director, EDHEC Risk & Asset Management Research Centre
Professor of Finance, EDHEC Business School
noel.amenc@edhec-risk.com

Felix Goltz
Senior Research Engineer, EDHEC Risk & Asset Management Research Centre
felix.goltz@edhec-risk.com

Adina Grigoriu
Head of Asset Allocation
EDHEC Investment Research
adina.grigoriu@edhec-risk.com

Authors’ address:
EDHEC Risk & Asset Management Research Centre, 400 promenade des Anglais - BP 3116
F-06202 Nice cedex 3 - France
Tel.: +33 (0)4.93.18.99.66
Abstract

This article develops an application of ETFs to the management of an absolute return fund. The use of dynamic core-satellite portfolio management makes it possible to construct absolute return funds using ETFs on stock and bond indices. As a result of the ease with which they are traded, ETFs make an ideal vehicle for putting dynamic risk budgeting into practice. The advantage of the dynamic core-satellite portfolio is that, unlike conventional strategic or tactical asset allocation, it relies solely on the observable price path of different ETFs, and a range of predefined parameters. So the problems of estimation and prediction uncertainty of the two conventional allocation methods are avoided. The combination of advanced dynamic risk-budgeting techniques and highly liquid and transparent instruments may provide a more investor-friendly way to deliver a given absolute return with a target level of volatility, independent of prevailing market conditions.
Introduction

Absolute return funds have seen widespread growth in the asset management industry in recent years. These funds claim to provide relatively smooth returns with a limited level of risk. Not unlike hedge fund managers, absolute return managers do not state a benchmark in terms of a market index or a peer group; instead, they try to obtain a given absolute return for given volatility, independent of prevailing market conditions.

As might be expected, these funds appeal to investors, but how the manager realises the objectives is the crucial point. Traditionally, there are two broad techniques that make it possible to achieve returns above the risk-free interest rate while keeping volatility in check.

The first borrows from modern portfolio theory. Managers attempt to obtain a broadly diversified portfolio across asset classes, diversification that allows significant risk reduction. With such strategic asset allocation, the correlations between the asset classes under consideration are needed as an input to the optimisation problem. While low correlation between asset classes or sub-classes allows enhanced risk reduction, these correlations are not known \textit{ex ante}. Rather, future correlations must be estimated from historical data, a necessity that poses two problems. First, the correlations that are used as input must be estimated from historical data. This leads to estimation risk: the correlations used as input may be different from the true correlations and lead to erroneous portfolio weights. While the problem of estimation risk can be alleviated by imposing structure on the correlation matrix or by using statistical shrinkage techniques, these methods are not widely used, as shown by a recent survey (EDHEC 2008).

Second, correlation coefficients are subject to change over time or across states of the economy. Indeed, in practice, they change greatly over time. Assets that were uncorrelated in the past may become highly correlated. Multivariate GARCH models (see Engle 2002 for a popular example) can be used to model this time dependence. In addition, correlations are not only time-dependent but also state-dependent. For example, Longin and Solnik (1995) have shown that the correlation of stock market returns in different countries is not constant and that it tends to increase in volatile market environments.

A second technique involves tactical asset allocation, which is based on the prediction of the returns of different asset classes or sub-classes over short time horizons. The return predictions must thus be transformed into portfolio holdings that benefit where predictions are accurate. For profitability, then, these strategies rely on the capacity of the manager to predict future price movements, through either econometric models or qualitative assessments. More importantly, in order to generate not just high returns, but also the smooth paths associated with absolute return funds, the manager must make correct predictions very consistently.

In practice, these two techniques are frequently combined, with managers performing strategic asset allocation based on historical correlations and making tactical bets. However, an alternative to such heavy reliance on historical estimates of correlation coefficients and chancy predictions about future returns is to use dynamic risk management techniques, such as Amenc, Malaise, and Martellini’s (2004) dynamic core-satellite approach. In a nutshell, this approach attempts to capture the upside of a satellite portfolio, while limiting the downside in the event that the satellite portfolio underperforms the core portfolio. Since it relies on dynamic exposure to broadly diversified portfolios, exchange-traded funds (ETFs) are ideally suited to serve as the building blocks in such an approach. The combination of a low-risk ETF in the core with a performance-seeking ETF in the satellite may well result in an absolute returns vehicle in which downside protection is achieved through dynamic trading in the ETFs.

The advantage of the dynamic core-satellite is that, unlike strategic or tactical asset allocation, it relies solely on the observable price path of different ETFs, and a range of predefined parameters. So the problems of estimation and prediction uncertainty of the two conventional methods are avoided.

The objective of this paper is to develop an application of ETFs to the management of an absolute return fund. The remainder of the paper proceeds as follows. First, we will describe the risk budgeting technique we use. Second, we use fixed-income and equity ETFs to construct an absolute returns fund. A third section compares this approach and traditional active management, in which the manager has views on the outperformance of an asset class and adjusts the weights accordingly. The aim of this section is to determine the rate of successful predictions necessary to attain the risk control obtained with dynamic risk budgeting. A final section concludes.
1. The Dynamic Core-Satellite Portfolio Process

In this section, we describe the methodological backbone of dynamic risk budgeting: the dynamic core-satellite approach, a novel technique for risk management proposed by Amenc, Malaise, and Martellini (2004). It is of interest that—through this nonlinear risk management technology—payoffs that involve a type of relative return guarantee can be achieved through dynamic trading in ETFs.

In essence, the core-satellite concept makes it possible to manage the tracking error of the overall allocation. If the investor has a given tracking error budget, the target tracking error can be achieved with static definitions of the proportion invested in the core and that invested in the satellite. However, management of the tracking error budget can also be made dynamic; the proportion invested in the active portfolio can vary as a function of the current cumulative outperformance of the overall portfolio with respect to the benchmark. This objective is achieved by transporting the method of traditional constant proportion portfolio insurance (CPPI) to core-satellite portfolio management, so as to allow more efficient relative risk control.

Standard CPPI, which was introduced by Black and Jones (1987) and Black and Perold (1992), allows the production of option-like positions through systematic trading rules. This procedure dynamically allocates total assets to a risky asset in proportion to a multiple of the cushion, i.e., the difference between current wealth and a desired protective floor. The effect is similar to that of owning a put option. Under such a strategy, the exposure of the portfolio tends to zero as the cushion approaches zero; when the cushion is zero, the portfolio is completely invested in cash. Thus, in theory, the guarantee is perfect: the strategy of exposure ensures that the portfolio never falls below the floor; in the event that it touches the floor, the fund is “dead”, i.e., it can deliver no performance beyond the guarantee.

These constant proportion portfolio insurance techniques, originally designed to ensure absolute performance, can be extended to a relative return context. The new method devised by Amenc, Malaise, and Martellini (2004) makes it possible for investors to gain full access to good tracking error, while keeping bad tracking error largely at bay; the method involves optimal dynamic adjustment of the fraction invested in the core and that invested in the satellite. It is, in a sense, a structured form of active management, as well as a natural extension of CPPI techniques.

An approach similar to standard CPPI can be taken to offer the investor a relative performance guarantee; in other words, a guarantee that any underperformance of the benchmark will be limited to a specified amount. The techniques of traditional CPPI still apply, provided that the risky asset is re-interpreted as the satellite portfolio, which contains relative risk with respect to the benchmark, and that the risk-free asset is re-interpreted as the core portfolio, which contains no relative risk with respect to the benchmark.

<table>
<thead>
<tr>
<th>Traditional CPPI</th>
<th>Relative Approach CPPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risky Asset</td>
<td>Satellite Portfolio</td>
</tr>
<tr>
<td>Risk-free Asset</td>
<td>Core Portfolio</td>
</tr>
</tbody>
</table>

This table compares the traditional CPPI to the relative approach CPPI.

Assume, for example, that the benchmark is a passive investment, e.g., a bond index. The guarantee is set at 90% of the benchmark value and we assume that the multiplier is equal to 4.

At the initial date $T_0$, portfolio value and benchmark value are normalised at 100, with a floor set at 90% of the benchmark value. The floor is thus $0.9 \times 100 = 90$. The cushion is therefore $100 - 90 = 10$. The investment in the satellite is then $10 \times 4 = 40$, which results in $100 - 40 = 60$ in the core. At date $T_1$, let us assume that the difference between the satellite and the benchmark is $+10\%$, as a result of the following scenario: $S = 0\%$, $C = -10\%$. In this case, the position invested in the core has decreased by $10\%$, from 60 to 54. Besides, the active portfolio value has remained stable at 40, while the benchmark has also decreased by $10\%$, from 100 to 90. The difference between the fund value ($94 = 54 + 40$) and the benchmark value ($90$) is now equal to $4$. The floor has dropped from $0.9 \times 100$ to $0.9 \times 90 = 81$. Thus, the cushion is now $94-81=13$. The new optimal fraction to invest in the satellite is $13 \times 4 = 52$, which leaves $94 - 52 = 42$ in the core portfolio. On date $T_1$, the resulting allocation is therefore $52/94 = 55\%$ in the satellite and $42/94 = 45\%$ in the core portfolio.

Let us assume, on the other hand, that the difference between the satellite and the benchmark is $-10\%$, as a result of the following scenario: $S = 0\%$, $C = +10\%$. In this case, the position invested in the core has increased by $10\%$, from 60 to 66. Besides, the active portfolio value has remained stable at 40, while the benchmark has also
increased by 10%, from 100 to 110. The floor is now at 0.9 × 110 = 99. The difference between the fund value (106 = 66 + 40) and the floor (99) is now equal to 7, meaning that the cushion has decreased from its initial value of 10. The new optimal fraction to invest in the satellite portfolio is 7 × 4 = 28, which leaves 106 − 28 = 78 in the core portfolio. On date \( T \) the resulting allocation is therefore 28/106 = 26% in the satellite and 78/106 = 74% in the core portfolio.

As can be seen from this example, the method leads to an increase in the fraction allocated to the satellite (from 40% to 55%) when the satellite has outperformed the benchmark. Indeed, the accumulation of past outperformance has resulted in an increase in the cushion, and thus greater potential for a more aggressive (and hence higher tracking error) strategy in the future. If, on the other hand, the satellite has underperformed the benchmark, the method leads to a tighter tracking error strategy (through a decrease of the fraction invested in the satellite portfolio) in an attempt to ensure that the relative performance objective is met.

This approach allows dissymmetric management of tracking error, ensuring that the underperformance of the portfolio with respect to the benchmark will be limited to a given level, while letting the investor gain fuller access to excess returns potentially generated by the active portfolio.

The benefit of this approach is that a dynamic version of a core-satellite approach allows an investor to truncate the relative return distribution so as to allocate the probability weights away from severe relative underperformance to the profit of more potential for outperformance.

It is standard practice to construct core-satellite portfolios by placing assets that are supposed to outperform the core in the satellites. However, during periods of temporarily unfavourable conditions these assets may underperform the core. The dynamic core-satellite approach described above makes it possible to reduce the impact of the satellite on performance during a period of relative underperformance, while maximising the benefits of the periods of outperformance.

Indeed, observation of investor behaviour shows that investor expectations are rarely symmetric. In other words, when stock market indices perform well, investors are happy to be earning relative returns, but when they perform poorly, they much prefer absolute returns. Techniques such as Value-at-Risk minimisation or volatility minimisation allow only symmetric risk management. For example, the minimum variance process leads to a renunciation of upside potential in the performance of commercial indices in exchange for lower exposure to downside risk, through tracking error constraints. While this strategy allows long-term outperformance, it can lead to significant short-term underperformance. It is also very hard to recover from severe market drawdowns.

In what follows, we describe non-linear dynamic allocation, a set of techniques that make it possible to focus on asymmetric risk management.

From an absolute return perspective, it is possible to propose a trade-off between the performance of the core and satellite. This trade-off is not symmetric, as it involves maximising the investment in the satellite when it is outperforming the core and, conversely, minimising the weight of the satellite when it underperforms the core. The aim of this kind of dynamic allocation is to allow outperformance, in terms of risk-adjusted returns with regard to a static core-satellite allocation. This dynamic allocation first requires a lower limit on underperformance with respect to the benchmark on the terminal date, i.e., \( V(T) > kB(T) \), where \( k \) is lower than one, e.g., \( k = 90\% \), and \( B(t) \) is the benchmark value at date \( t \). It is then necessary to provide access to potential outperformance of the benchmark based on investment in a satellite whose value on date \( t \) is denoted by \( S(t) \).

As mentioned above, Amenc, Malaise, and Martellini (2004) devise a method, known as the dynamic core-satellite management process, which allows investors to achieve asymmetric tracking error management. This method leads to an increase in the fraction allocated to the satellite when the satellite has outperformed the benchmark. Indeed, the accumulation of past outperformance has resulted in an increase in the cushion, and therefore in the potential for a more aggressive (and hence higher tracking error) strategy in the future. If the satellite has fallen short of the benchmark, the method leads to a tighter tracking error strategy (through a decrease of the fraction invested in the satellite portfolio).

This dual objective is achieved by a suitable extension of the CPPI to a context of relative risk management. The concept of this process was introduced above. Let \( V(t) \) be the portfolio on date \( t \). It can be divided into a floor and a cushion, according to the relation \( V(t) = F(t) + C(t) \). The floor is given by \( F(t) = kB(t) \). Take the investment in the satellite, i.e., the risky asset in a relative context, to be \( E(t) = mC(t) \), with \( m \) as a constant multiplier, while the remainder of the portfolio \( V(t) - E(t) \) is invested in the benchmark.
The process for cushion growth tells us about the upside potential and allows us to calibrate an optimal value for $m$.

\[ dC_t = dV_t - dF_t = E_t \times \frac{dS_t}{S_t} + (V_t - E_t) \times \frac{dB_t}{B_t} - dF_t \]

\[ dC_t = mC_t \times \frac{dS_t}{S_t} + (C_t + F_t - mC_t) \times \frac{dB_t}{B_t} - F_t \times \frac{dB_t}{B_t} \]

\[ dC_t = C_t \left( m \frac{dS_t}{S_t} + (1 - m) \frac{dB_t}{B_t} \right) \]

It is useful to write explicitly the final value of the portfolio and the cushion. We consider a floor given as $F(t) = e^{-r(T-t)K}$, where $K$ is the guaranteed capital. The overall portfolio value is $A(t)$. Moreover, we consider a risky portfolio that is invested in equity. The fraction of the portfolio invested in equity $E(t)$ is given by the fixed rule $E(t) = mC(t) = m(A(t) - F(t))$, while the remainder of the portfolio $A(t) - E(t)$ is invested in the risk-free asset.

We have the following dynamics for asset and portfolio value:

\[ \frac{dS_t}{S_t} = \mu dt + \sigma dW_t \]

\[ \frac{dB_t}{B_t} = r dt \]

\[ dA_t = E_t \times \frac{dS_t}{S_t} + \left( A_t - E_t \right) \times \frac{dB_t}{B_t} \]

The value of the portfolio at terminal date is then $A(T) = F(T) + C(T) = K + C(T)$.

To estimate $C(T)$, note that

\[ dC_t = dA_t - dF_t = E_t \times \frac{dS_t}{S_t} + \left( \frac{A_t}{C_t + F_t} - E_t \right) \times \frac{dB_t}{B_t} - \frac{dF_t}{F_t} \]

or

\[ \frac{dC_t}{C_t} = \left( m \frac{dS_t}{S_t} + (1 - m) \frac{dB_t}{B_t} \right) = \frac{dB_t}{B_t} + m \left( \frac{dS_t}{S_t} - \frac{dB_t}{B_t} \right) \]

One can solve the previous stochastic differential equation to obtain:

\[ C_T = C_0 \left( \frac{S_T}{S_0} \right)^m \exp \left[ \left( r - m \left( r - \frac{1}{2} \sigma^2 \right) - m^2 \frac{\sigma^2}{2} \right) T \right] \]

\[ A_T = F_T + C_0 \left( \frac{S_T}{S_0} \right)^m \exp \left[ \left( r - m \left( r - \frac{1}{2} \sigma^2 \right) - m^2 \frac{\sigma^2}{2} \right) T \right] \]

To conclude—and before applying the approach to a practical case of managing a portfolio of ETFs—let us reiterate the rationale behind the dynamic core-satellite approach. The core portfolio makes it possible to respect the investor’s long-term risk return objectives, while the satellite portfolio provides access to upside potential of the satellite portfolio. The dynamic allocation process will systematic increases in exposure to the satellite
portfolio when it does well, while controlling risks by shifting to the core when the satellite does poorly. Thus, this approach allows an investor to truncate the relative return distribution so as to allocate the probability weights away from severe relative underperformance in favour of more potential for outperformance.

In short, asymmetric tracking error management is made possible; the underperformance of the portfolio with respect to the benchmark will be limited to a given level, while the investor gains fuller access to excess returns potentially generated by the active portfolio.

2. Constructing Absolute Return Funds with ETFs

To illustrate how dynamic risk budgeting may be used to design absolute return funds with ETFs, we combine a core portfolio that invests in medium-term bonds and a satellite portfolio that invests in an equity ETF. The objective of the proposed strategy is to achieve smooth returns because of the low volatility of the core portfolio. In addition, the aim is to benefit from the returns on the stock market ETF if stocks outperform bonds, while achieving a protection from the downside risk of the equity investment.

The details of the strategy are as follows: the core is made up of the EuroMTS for bonds with three to five years to maturity and the satellite invests in the EuroStoxx 50. The data used are monthly returns including coupon or dividend payments for the period from January 1999 to December 2007. The starting period is determined by the bond data, available only as of the introduction of the Euro, as is typical for data on Euro-denominated bonds. The value of the multiplier is set to six, while the floor is defined at 90% of the value of the bond core portfolio. The weight in the satellite is constrained to a maximum of 60% of the overall portfolio.

Furthermore, we use an extension to the basic dynamic core-satellite approach to achieve the absolute returns objective. In particular, we introduce a maximum drawdown limit equal to 10% in order to take into account the investor’s aversion to drawdowns in the absolute value of the overall portfolio. In fact, there are suitable extensions of the standard dynamic asset allocation strategies that can accommodate the presence of maximum drawdown constraints. These strategies are developed by Ested and Kritzman (1988), who label them “time invariant portfolio protection strategies” (TIPP), and formalised by Grossman and Zhou (1993) and Cvitanic and Karatzas (1995). By imposing a maximum drawdown constraint of 10% and using our multiplier of six, we note that the maximum allocation to the satellite portfolio is 60%. Hence, the defensive bond portfolio used as the core will always constitute at least 40% of the overall portfolio.

Exhibit 2 shows the cumulative returns of the strategy we use, as well as those of the core and satellite portfolios. In addition, to highlight the built-in protection of this investment strategy, the level of the floor is displayed.
From this exhibit, a number of conclusions can be drawn. The dynamics of the core portfolio confirm the conservative character of the core investment. However, we also see that performance of the bond core was quite flat over the last two years of the period. For the satellite portfolio, we observe that returns are higher if we look at the entire period. More importantly, fluctuations of the value of the satellite portfolio are tremendous, with a sharp increase in value up to the year 2000 and a radical decline from then until 2003, followed again by a steady increase until the end of 2007. The dynamic core satellite (DCS) combines the advantages of each of its ingredients—that is, the smooth performance of the bond core and the upside potential of the equity satellite. As a result, performance is smooth over the entire period, and cumulative returns at the end of the period are actually higher than those of the satellite. It is also interesting to look at the dynamics of the floor. As the value of the dynamic core-satellite fund increases, the floor is pulled up to increase the level of protection. It is also instructive to look at the performance in the stock market downturn beginning in the year 2000. In fact, the dynamic core-satellite portfolio is little affected. As the portfolio value approaches the floor, the allocation is shifted to the core portfolio. This behaviour is illustrated in exhibit 3, which shows the weights held in the core and the satellite over time.
Exhibit 3: Absolute Return Fund: Evolution of the Allocation to the Core and the Satellite Portfolios

It is important to recall the objective of the strategy analysed here. The conservative nature of the core and the dynamic risk management process both aim to achieve smooth returns over time. Exhibit 4 shows the return obtained over rolling periods of one year. From this exhibit, we see that the dynamic core-satellite portfolio achieves positive returns over most rolling windows of one year. Even in the period after the year 2000, returns are close to zero, though slightly negative. In fact, the maximum loss over a one-year rolling period is -6.68%. This is in stark contrast to the satellite, which displays returns below -20% over a range of annual periods. In fact, the behaviour of the dynamic core-satellite portfolio is close to that of the defensive bond portfolio that makes up the core.

Exhibit 4: Absolute Return Fund: Performance of the Core, the Satellite, and the DCS over a One-Year Rolling Period
Risk and return statistics for the dynamic core-satellite strategy confirm the conclusions from the figures analysed above. In particular, exhibit 5 shows that the average return exceeds those of the core by roughly 337 basis points, while maintaining low levels of risk.

### Exhibit 5: Absolute Return Fund: Risk and Return Statistics for the Core, the Satellite, and the DCS.

<table>
<thead>
<tr>
<th></th>
<th>Average return*</th>
<th>Max DD</th>
<th>Volatility*</th>
<th>VaR**</th>
<th>CVaR**</th>
<th>Sharpe***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>4.00%</td>
<td>-3.08%</td>
<td>2.40%</td>
<td>0.83%</td>
<td>1.15%</td>
<td>0.83</td>
</tr>
<tr>
<td>Satellite</td>
<td>5.16%</td>
<td>-59.90%</td>
<td>18.41%</td>
<td>8.56%</td>
<td>12.90%</td>
<td>0.17</td>
</tr>
<tr>
<td>DCS - base case</td>
<td>7.37%</td>
<td>-9.01%</td>
<td>6.42%</td>
<td>1.97%</td>
<td>2.57%</td>
<td>0.84</td>
</tr>
</tbody>
</table>

* annualised statistics are given
** non-annualised 5%-quantiles are estimated
*** risk-free rate and MAR are fixed at 2%

3. A comparison with active management based on return forecasts.

We have seen that the dynamic risk-budgeting approach is able to provide sound absolute return management. The remarkable trait of the approach is the absence of any prediction. The systematic allocation based on past values of the core and satellite portfolios means that the investor bears no forecasting risk.

An alternative is to forecast the relative returns of the satellite. If the satellite is expected to have higher returns than the core, the weight of the satellite should be increased; otherwise, it should be decreased. Predictions may be founded either on an econometric process or on qualitative assessment by the manager or an outside expert. Of course, performance will depend on the accuracy of predictions. If the predictions are accurate most of the time, we expect the portfolio to display attractive performance. In this section, we first assess the performance displayed by a manager with positive prediction skill and then analyse how the results change if we increase this skill.

The detailed setup of the analysis is as follows. The assumptions below are used in a simulation of an active manager’s approach:
- if the manager thinks that the satellite will outperform the core on the following month, he will allocate 60% of his portfolio to the satellite, the maximum allowed in the dynamic risk-budgeting process above. The remaining 40% is allocated to the satellite
- if the manager thinks that the core will outperform the satellite on the following month, he will allocate 100% of the portfolio to the core
- the manager rebalances his holdings on a monthly basis and, on average, is right seven of every twelve months

Using the same time period as above (January 1999 to December 2007) and the same core and satellite, we simulate 1,000 scenarios. Each scenario corresponds to a time series of returns for the active manager, given his bets. As the basis for the simulation, we use a hit ratio of 58.3%, i.e., the average active manager is right, on average, seven of every twelve months. The 1,000 scenarios thus represent the returns obtained by 1,000 hypothetical active managers who have a hit ratio of 58.3%.

Exhibit 6 displays risk and return statistics for the average over these 1,000 scenarios and compares them to the base case strategy from above, i.e., the dynamic core-satellite strategy. The average over all scenarios corresponds to an equal-weighted portfolio of the 1,000 active managers. The first two lines of table 4 reproduce the statistics for the core and the satellite portfolio.

It is instructive to compare the time series of the active manager portfolio to the series of the dynamic core-satellite strategy. The average annualised return of the dynamic core satellite (7.37%) is slightly higher than that for this portfolio (7.25%). Moreover, the maximum drawdown, volatility, VaR, and CVaR are significantly lower for the dynamic core satellite. The higher risk statistics for the portfolio of active managers show the impact of bad predictions. In fact, even though these managers are right most of the time, they err five months per year, thus exposing the investor to a significant downside risk.

This result holds for the equal-weighted portfolio that is diversified across 1,000 managers. Using a single manager with the same ability leads to greater uncertainty, as results may be much better or much worse. First, the results obtained by a single manager depend on the actual hit ratio displayed over the sample period as
opposed to his true long-term hit ratio. Second, given a realised hit ratio, portfolio performance depends on the consequences of his correct or wrong predictions. Predicting outperformance over a month during which the satellite underperforms by 1% is hardly the same as predicting outperformance over a month during which the satellite underperforms by 10%, even though both are instances of forecast error. Likewise, predicting outperformance over a month during which the satellite outperforms by 10% is more valuable than predicting outperformance over a month during which the satellite outperforms by 1%, though both are instances of an accurate forecast.

The dispersion between managers with the same forecasting ability is shown in the lower part of table 4. The worst performing manager (or scenario) achieves average annualised returns of 0.64% while the best manager achieves 13.35%. Likewise, maximum drawdown and other risk measures vary widely from one manager or scenario to another.

Exhibit 6: Risk and Return Statistics for the Core, the Satellite and the Active Management Scenarios.

<table>
<thead>
<tr>
<th></th>
<th>Average return</th>
<th>Max DD</th>
<th>Volatility*</th>
<th>VaR**</th>
<th>CVaR**</th>
<th>Sharpe***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>4.00%</td>
<td>-3.08%</td>
<td>2.40%</td>
<td>0.83%</td>
<td>1.15%</td>
<td>0.83</td>
</tr>
<tr>
<td>Satellite</td>
<td>5.16%</td>
<td>-59.90%</td>
<td>18.41%</td>
<td>8.56%</td>
<td>12.90%</td>
<td>0.17</td>
</tr>
<tr>
<td>DCS - base case</td>
<td>7.37%</td>
<td>-9.01%</td>
<td>6.42%</td>
<td>1.97%</td>
<td>2.57%</td>
<td>0.84</td>
</tr>
<tr>
<td>Average of 1000 scenarios</td>
<td>7.25%</td>
<td>-14.72%</td>
<td>7.60%</td>
<td>2.84%</td>
<td>5.36%</td>
<td>0.70</td>
</tr>
<tr>
<td>Worse performing scenario</td>
<td>0.64%</td>
<td>-29.61%</td>
<td>8.12%</td>
<td>4.16%</td>
<td>6.44%</td>
<td>-0.17</td>
</tr>
<tr>
<td>Best performing scenario</td>
<td>13.35%</td>
<td>-2.81%</td>
<td>6.25%</td>
<td>0.76%</td>
<td>1.53%</td>
<td>1.81</td>
</tr>
</tbody>
</table>

* annualized figures
** 5% quartile
*** RFR = 2%

Overall, the results show that an actively managed portfolio built on largely accurate forecasts lead to results worse than those of the dynamic core-satellite process. Moreover, if a single manager is chosen, there is an additional risk. In fact, a given manager may produce poor results despite his forecasting ability.

It is interesting to examine the parameter for forecast ability in greater detail. However, it is not our objective to make a statement about which degree of forecast accuracy is realistic or how correct forecasts can be obtained. Rather, it is interesting to assess the results assuming even higher hit ratios. Above, we have assumed a hit ratio of 58.3%. Below, we repeat the simulation using average hit ratios of 7/12, 8/12, 9/12, 10/12, and 11/12.

In particular, we simulate the same active management approach with increasing hit ratios and observe the hit ratio necessary to achieve the same maximum level of risk (maximum drawdown and worst performance over a rolling one-year period) and the same probability of not losing more than 10% of the capital over a one-year period. Exhibit 7 shows the results.

Exhibit 7: Evolution of the Risk and Return Statistics as a Function of the Hit ratio of the Active Manager

<table>
<thead>
<tr>
<th>Hit ratio</th>
<th>DCS 7/12</th>
<th>DCS 8/12</th>
<th>DCS 9/12</th>
<th>DCS 10/12</th>
<th>DCS 11/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average return</td>
<td>7.37%</td>
<td>7.25%</td>
<td>10.02%</td>
<td>12.85%</td>
<td>15.75%</td>
</tr>
<tr>
<td>Max DD</td>
<td>-9.01%</td>
<td>-14.72%</td>
<td>-11.70%</td>
<td>-9.18%</td>
<td>-7.08%</td>
</tr>
<tr>
<td>Worse performance over a rolling one year period</td>
<td>-6.68%</td>
<td>-30.5%</td>
<td>-30.5%</td>
<td>-24.7%</td>
<td>-19.0%</td>
</tr>
<tr>
<td>Probability of losing more than 10% on a rolling one year period</td>
<td>0.00%</td>
<td>3.02%</td>
<td>1.29%</td>
<td>0.38%</td>
<td>0.11%</td>
</tr>
</tbody>
</table>

The results show that a hit ratio of seven out of twelve is necessary to generate returns that are equivalent to those of the dynamic core-satellite approach. To obtain a maximum drawdown equal to that of the dynamic core-satellite approach, a hit ratio of nine out of twelve is necessary. If we look at the probability of losing more than 10% of capital over a one-year period, the necessary hit ratio is eleven out of twelve. It should be noted that the results in table are for the equal-weighted portfolio of 1,000 hypothetical managers. The additional risk of manager selection borne by an investor who takes such an approach is thus ignored.

Conclusion

We have argued that the core-satellite approach can be extended to dynamic investment of a portfolio of ETFs, allowing investors to protect their portfolio from excessive loss. Our application of dynamic core-satellite portfolio management shows that it makes it possible to use ETFs on stock and bond indices to construct
absolute return funds based on this dynamic allocation approach. In particular, the approach makes it possible to shake off the dependence on forecast accuracy that traditional techniques for absolute return fund construction are saddled with. In short, for generating absolute returns, dynamic risk-budgeting techniques are a more reliable alternative, even if one has managers with excellent forecasting ability at one’s disposal. As a result of the ease with which they are traded, ETFs make an ideal vehicle for putting such dynamic risk budgeting into practice. The combination of advanced dynamic risk-budgeting techniques and highly liquid and transparent instruments may provide a more investor-friendly way to deliver a given absolute return with a target level of volatility, independent of prevailing market conditions.

References


