

Capturing the Market, Value, or Momentum Premium with Downside Risk Control: Dynamic Allocation Strategies with Exchange-Traded Funds

July 2011



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Amundi ETF



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This research was conducted as part of the second year of research for the *Core-Satellite and ETF Investment* chair endowed by Amundi ETF

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Abstract



Abstract

There is extensive evidence that investment strategies based on momentum and value are attractive for portfolio managers who seek higher performances. Momentum and value are among the most robust return drivers in the cross section of expected returns. Dynamic risk budgeting methodologies such as Dynamic Core Satellite strategies (DCS) are used to provide risk-controlled exposure to different asset classes. We examine how to exploit the value and momentum anomalies using a DCS investment model. This paper shows that the DCS approach can boost portfolio returns while keeping downside risk under control. The implementation of the portfolio strategies is enabled by exchange-traded funds which are natural investment vehicles since they offer a broad exposure to the markets and provide the necessary liquidity to the frequent rebalancing of the DCS model.

1. Introduction



1. Introduction

Investors are usually willing to take on risk only if they are compensated for it with greater expected reward. Although such theories as Ross's (1976) arbitrage pricing theory (APT) suggest that there may be multiple sources of risk, including both systematic risk factor exposures and idiosyncratic risk (Merton 1987; Malkiel and Xu 2006), that are rewarded in equity markets, both empirical financial research and practical investment strategies rely mainly on a market-wide risk factor represented by a broad portfolio of stocks. This reliance is reflected in the dominance of country and regional indices and ETFs that provide exposure to market-wide equity risk for different regions. There are also, however, many other types of equity exposure that can lead to risk premia. These exposures exploit differences in expected returns across stocks and tilt the portfolio towards stocks with higher expected returns.

Value and momentum are among the most robust return drivers in the cross section of expected equity returns. Starting with Jegadeesh and Titman (1993), the academic literature has provided ample evidence that stocks with high returns in the past yield high returns in the future. The momentum effect is a short-term phenomenon that holds over time periods of one to four quarters of past and future returns. Another driver of cross-sectional return differences is the value effect. Stocks with low price-earnings ratios or high dividend yields tend to outperform stocks with high price-earnings ratios or low dividend yields. This effect is well known to investment professionals, who have long advocated buying cheap or distressed stocks (Graham 1934), a recommendation whose

soundness been confirmed by many empirical studies (Fama and French 1992).

Using such strategies on individual stocks, however, may result in large trading costs, thus greatly reducing the return benefits to momentum or value strategy (Korajczyk and Sadka 2004; Lesmond, Schill, and Zhou 2003). An alternative is to use these strategies by sector (Grinblatt and Moskowitz 1999; O'Neal 2000; Scowcroft 2004). Exchange-traded funds (ETFs) are a natural for putting into effect strategies that profit from value and momentum across sector indices, as they are a liquid investment medium.

Although exposure to broad market risk or to value and momentum effects is expected to yield attractive performance over the long run, particular market conditions can hurt investors who are exposed to these factors. When moving away from the market factor and trying to exploit value or momentum effects, investors' portfolios tend to become more concentrated, increasing drawdown risk. In this paper, we evaluate the access to value and momentum premia gained by using risk-controlled strategies. In particular, we use both the broad market index and value or momentum trading strategies across sectors in a dynamic core-satellite (DCS) portfolio. We assess the risk-control benefits of the DCS portfolios.

In addition to the benefits of dynamic risk budgeting, the paper highlights the role of ETFs in value and momentum trading strategies that are often perceived to be strategies for individual stocks. A contribution of this paper is to apply value and momentum investing to exchange-

1. Introduction

traded funds, thus focusing on sector-level effects. The paper is organised as follows: the first part reviews the academic sources and theory on which we will base our experiments and the second part describes our method and explains our data choices. The third part develops and discusses our findings. A final section summarises our conclusions.

1. Introduction

2. Related Literature



2. Related Literature

Here we provide an overview of the literature on the cross-sectional effects that we exploit through sector-based ETF strategies.

The value effect was first described by Graham and Dodd (1934) in their book *Security Analysis*. The general idea was that a security could be mispriced with respect to the value of a company's operations and that investors should take advantage of this mispricing by buying the undervalued stocks and selling the overvalued ones. Graham is a pioneer in the use of the price-earnings ratio (PER), which became a key ratio in the analysis of the value of securities.

This basic intuition that value stocks provide higher expected returns has been confirmed in many academic studies. Basu (1983) finds that there is a positive relation between average return and price-earnings ratio. Stattman (1980) and Rosenberg, Reid, and Lanstein (1985) show that there is a positive relation between average return and book-to-market equity. Finally, Chan, Hamao, and Lakonishok (1992) find that book-to-market equity is also a powerful factor of average returns on Japanese stocks. Building their paper on all research into the cross-section of expected returns, Fama and French (1992) show that for the period from 1963 to 1990 size of equity and book-to-market equity capture the cross-sectional variation in average stock returns.

The momentum effect, on which investment professionals also rely, is depicted in the literature as a short-term phenomenon in which the past performance of assets is persistent (so-called return continuation). In other words, assets that have performed

well in the past will continue to perform well. Jegadeesh and Titman (1993) provide evidence that strategies that buy stocks that have performed well in the past and sell those that have performed poorly generate significant positive returns over holding periods of three to twelve months.

Value and momentum strategies may improve portfolio performance and reduce sensitivity to cyclicalities (Babameto and Harris 2008), so, in this paper, we integrate value and momentum strategies through dynamic core-satellite portfolios. To put these strategies into effect, we rely on the dynamic core-satellite portfolio framework developed by Amenc, Malaise, and Martellini (2004). Amenc, Goltz, and Grigoriu (2010) do further research into the use of dynamic core-satellite portfolios. Since these portfolios offer exposure to the market, they assert that the best way to get broad and diversified exposure to market indices would be to invest in ETFs. These instruments provide transparent exposure to the market and liquidity. This liquidity is one key requirement of our strategy since it involves frequent rebalancing.

The objective of this paper is to introduce a new way to exploit these effects. We have seen that the literature abounds with evidence of the benefits of both value and momentum strategies. In practice, however, these strategies often lead to losses. Indeed, when certain stocks become cheap as measured by dividend yield or PER, it may still take them time to recover, thereby exposing investors to serious drawdown. Likewise, momentum strategies could be affected by market conditions in which past winners do worse than past losers. In general, reducing the universe of stocks by

2. Related Literature

excluding growth stocks or past losers will automatically lead to concentration greater than that of holding a portfolio of all stocks and is thus likely to expose investors to drawdown risk. By implementing these strategies in a dynamic core-satellite portfolio, we enable the investor to get exposure to these risk premia and protection from downside risk.

2. Related Literature

3. Data and Methodology



3. Data and Methodology

In this section, we describe both the data we use to build our portfolios and the dynamic core-satellite strategy.

3.1 Data

In this paper, all of our data is downloaded from Datastream on a monthly basis and covers the period from 31 January 1989 to 31 December 2009. Our investment universe is limited to Europe equities. So, because of the large number of securities in this investment universe and because this index is already subdivided into sector indices, we select the STOXX Europe 600 and its sector sub-indices. We use monthly data from the following sector sub-indices:

- Auto & parts
- Banks
- Basic resources
- Chemicals
- Construction & materials
- Financial services
- Food & beverage
- Health care
- Industrial goods & services
- Insurance
- Media
- Oil & gas
- Technology
- Telecoms
- Utilities

3.2 Methodology

3.2.1 The dynamic core-satellite strategy

The core-satellite approach divides the portfolio into a core component, which fully replicates the investor's designated benchmark, and a performance-seeking component, made up of one or more satellites, which is allowed higher tracking error. Although the weights allocated to the

core and to the satellite can be static, the proportion invested in the performance-seeking portfolio (the satellite) can also fluctuate as a function of the current cumulative outperformance of the overall portfolio, thus making the approach dynamic.

The dynamic core-satellite concept builds on the principle of constant proportion portfolio insurance (CPPI). In CPPI, total assets are dynamically allocated to a risky asset in proportion to a multiple of a cushion that is the difference between current portfolio value and a desired protective floor. This allocation strategy produces an effect similar to that of owning a put option. The portfolio's exposure 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 ensures that the portfolio never falls below the floor; in the event that it touches the floor, the fund is "dead"; that is, it can deliver no performance beyond the guarantee.

This CPPI procedure can be transferred to a relative-return context. Amenc, Malaise, and Martellini (2004) show that an approach similar to standard CPPI can be taken to offer the investor a relative-performance guarantee (underperformance of the benchmark is capped). Conventional CPPI techniques still apply, as long as the risky asset is reinterpreted as the satellite portfolio, which contains risk with respect to the benchmark, and the "risk-free" asset is reinterpreted as the core portfolio, which contains no risk with respect to the benchmark. The key difference from CPPI is that the core or benchmark portfolio can

3. Data and Methodology

itself be risky. In a relative-risk context, the dynamic core-satellite investment can be used to improve the performance of a broad equity portfolio by adding riskier asset classes to the satellite. Dynamic core-satellite investing may also be of interest to pension funds, which must manage their liabilities: the core then is made up of a liability-hedging portfolio, and the satellite is expected to deliver outperformance.

This dynamic version of a core-satellite approach, which can be seen as a structured form of portfolio management, is hence a natural extension of CPPI. The advantage of the approach is that it allows an investor to truncate the relative-return distribution in such a way as to allocate the probability weights away from severe relative underperformance and towards greater potential outperformance.

From an absolute-return perspective, it is possible to propose a tradeoff between the performance of the core and satellite. This tradeoff is not symmetric, as it involves maximising the investment in the satellite when it is outperforming the core and, conversely, minimising it when it is underperforming. The aim of this dynamic allocation is to produce greater risk-adjusted returns than those produced by static core-satellite management. Like standard CPPI, this dynamic allocation first requires the imposition of a lower limit on underperformance of the benchmark at the terminal date. This so-called floor is usually a fraction of the benchmark portfolio, say 90%. Investment in the satellite then provides access to potential outperformance of the benchmark.

Dynamic core-satellite investment has two objectives: to increase the fraction allocated to the satellite when the satellite has outperformed the benchmark and to reduce this fraction when the satellite has underperformed the benchmark.

This dual objective can be met with a suitable extension of CPPI to management of relative risk. Let P_t be the value of the portfolio at date t . The portfolio P_t can be broken down into a floor F_t and a cushion C_t , according to the relation $P_t = F_t + C_t$. B_t is the benchmark. The floor is given by $F_t = kB_t$, where k is a constant less than one. Finally, let the investment in the satellite be $E_t = wS_t = mC_t = m(P_t - F_t)$, with m a constant multiplier greater than one and w the fraction invested in the satellite. The remainder of the portfolio, $P_t - E_t = (1-w)B_t$, is invested in the benchmark.

In a relative-return investment, the core will contain some assets that closely track a given benchmark, whereas the satellite will have assets that ought to outperform this benchmark.

This method leads to an increase in the fraction allocated to the satellite when the satellite outperforms the benchmark. An accumulation of past outperformance results in an increase in the cushion and therefore in the potential for a more aggressive strategy in the future. If the satellite has underperformed the benchmark, however, the fraction invested in the satellite decreases in an attempt to ensure that the relative performance objective will be met.

3. Data and Methodology

3.2.2. Extensions to Dynamic Core-Satellite Analysis

Setting the floor is the key to dynamic core-satellite management, since it ensures asymmetric risk management of the overall portfolio. If the difference between the floor and the total portfolio value increases, that is, if the cushion becomes larger, more of the assets are allocated to the risky satellite. By contrast, if the cushion becomes smaller, the fraction of investments in the satellite decreases.

In the standard case, the floor is a constant fraction of the benchmark value; it thereby protects the portfolio from severe relative losses. Depending on the investment purpose, however, different floors might be used to exploit more fully the benefits of core-satellite management. Indeed, core-satellite management can accommodate more complex or even multiple floors.

The most commonly used alternative floors are the capital guarantee floor, the maximum drawdown floor, and the trailing performance floor. The capital guarantee floor, usually used in CPPI, attempts to preserve initial invested wealth. Maximum drawdown floors are designed to prevent the total portfolio value from falling more than a specified fraction of the highest asset value it has ever attained. Finally, the trailing performance floor is meant to prevent a portfolio from posting negative performance over a twelve-month trailing horizon, regardless of the performance of equity markets.

In addition to imposing floors, dynamic core-satellite management can incorporate so-called investment goals. Instead of

imposing a lower limit for the total portfolio value, an investment goal (or cap) restricts the upside potential of the portfolio. Although at first glance they may seem counterintuitive, goal-directed strategies reflect the possible failure of an investor to gain additional utility once some wealth is reached. In other words, once this wealth is reached the hope of realising more gains becomes the fear of losing accumulated wealth. By forgoing this possible extra wealth, investors benefit from a decrease in the cost of downside protection. These investment goals may be constant or they may be a deterministic or stochastic function of time. We now turn to some examples that illustrate how ETFs can be used in core-satellite investing.

4. Access to the Market Risk Premium with Downside Control



4. Access to the Market Risk Premium with Downside Control

Combining equity and cash may, as a result of diversification, lead to risk reduction, but weighting stocks and cash statically does not fully exploit the possibilities of risk management. So this section assesses the ways in which dynamic adjustments of exposure to a cash core (FRANCE PIBOR one-month offered rate) and an equity satellite can ensure that an absolute return fund reaches its objectives.

Although there is no single definition of the absolute return concept, most investors interested in such strategies have two main expectations, one having to do with performance management and the other with risk management. In other words, they have a performance target (usually expressed as a multiple of a cash rate or as a constant target) that they expect to hit regardless of market conditions, and they expect to avoid large drawdowns (with a maximum drawdown set at 10% in the application that follows).

We first specify a maximum drawdown floor equal to 10% and a performance cap (investment goal) set at wealth achieved by compounding twice the cash rate over the twenty-year period.¹ This cash rate is the France PIBOR 1 month interest rate from 1989 to 1999 and the EONIA from 2000 to 2009. In this case, the goal is 700% of the initial wealth at the end of the twenty-year horizon. We then proceed with dynamic core-satellite allocation, the core invested in a bond ETF and the satellite in a broad stock market index (STOXX Europe 600); the maximum allocation to the satellite is set at 50%.

We also build the fixed-mix portfolio with cash and the broad equity index. From a

risk management point of view, we set the constant weight of the fixed-mix strategy so that the historical maximum drawdown (MDD) is equal to the preservation objective of the simple DCS, which results in 10% maximum peak-to-valley drawdown. Thus, by authorising the fixed-mix strategy to lose up to 10% historically, we set the mix at 12.68% in large-cap equities and 87.32% in cash.

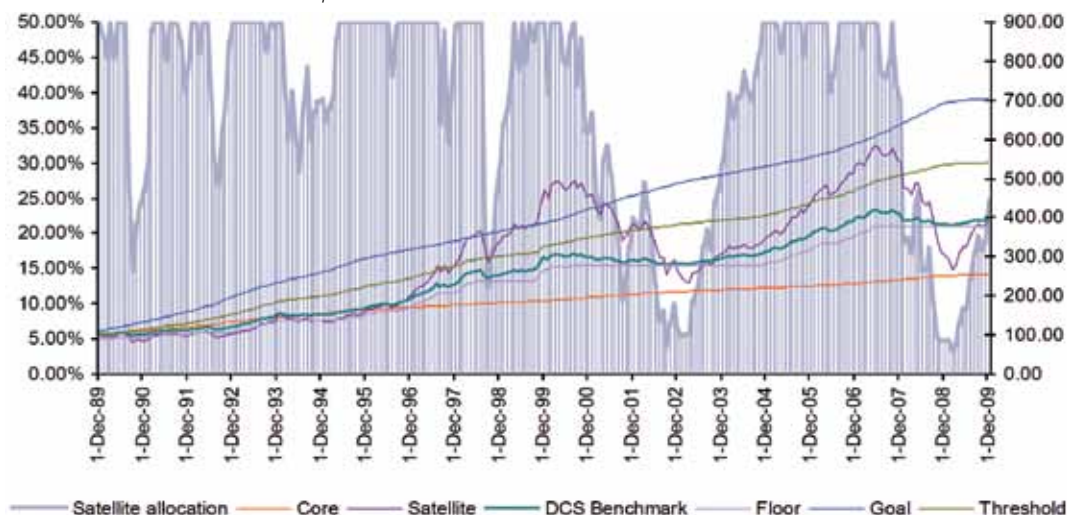
Exhibit 1 shows the cumulative returns of the strategy we put into effect, as well as of the core and the satellite portfolios. In addition, to highlight the built-in protection of this investment strategy, the floor, threshold, and goal are displayed as well.

It is clear that the core portfolio increases throughout the entire period, whereas the equity portfolio fluctuates significantly, with sharp increases before 2000 and steep falls from 2000 to 2002. It rose from 2002 to 2007 and again dropped sharply from 2007 to 2008. The DCS (bold green line) combines the advantages of each of its ingredients: the smooth performance of the cash 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 much higher than those of the cash core and roughly the same as those of the satellite. The graph also shows the dynamics of the floor, which reflects the degree of protection. The DCS portfolio is largely unaffected during the market downturn. As the portfolio value approaches the floor, allocation shifts to the core.

1 - Naturally, if the goal is a multiple of cash rate, there is no replicating asset, as there is no risk-free asset that would pay more than 100% of the cash rate. However, the multiple of the cash rate corresponds to an objective commonly set by absolute return funds.

4. Access to the Market Risk Premium with Downside Control

Exhibit 1: Evolution of the DCS and its parameters



2 - The annual risk-free rate is assumed to be 2%.

The annual risk and return statistics for the DCS confirm the conclusions from exhibit 1. In particular, the DCS portfolio has higher returns than both the core and the fixed-mix portfolio. Since the aim of DCS portfolio is to deliver asymmetric performance—reduced downside risk—its Sharpe ratio is not as good as that of the other two portfolios, but the Sharpe ratio may not be an accurate measure of the risk/reward tradeoff. So we list a number of measures of extreme risk (exhibit 3) to compare the drawdown risk of these four portfolios.

Exhibit 2: Risk and return statistics for the core, the satellite, the fixed-mix strategy and the DCS

	Return	Volatility	Sharpe ratio ²
Core	4.66%	0.81%	3.28
Satellite	8.37%	16.43%	0.39
DCS	6.88%	5.68%	0.86
Fixed-mix	5.07%	3.04%	1.01

It is clear that downside risk of the DCS portfolio is significantly lower than that of the equity satellite portfolio. The maximum drawdown of the DCS does not breach the 10% limit even when that of the satellite is as high as 54.34%. The 99%

VaR over one month is only 3.93% for the DCS portfolio, whereas it is 12.57% for the satellite. Both three-month and twelve-month trailing returns have been greatly improved. The Calmar ratio, which is calculated by dividing the annual return by the maximum drawdown (Young 1991), indicates the premium for bearing one additional percentage point of drawdown risk. A higher Calmar ratio implies better downside-risk-adjusted performance. In exhibit 3, it is clear that the DCS portfolio has achieved the highest Calmar ratio, which suggests that, per unit of downside risk, the DCS portfolio is the most efficient portfolio. When the DCS portfolio and the *ex post* fixed-mix strategy are compared, the DCS portfolio is again more efficient. Though we keep the maximum drawdown within 10%, the return of the fixed-mix strategy is lower than that of the DCS portfolio because of the constant high allocation to the core portfolio. So, for the same downside risk, the fixed-mix strategy does not outperform the DCS.

4. Access to the Market Risk Premium with Downside Control

Exhibit 3: Extreme risk statistics for the core, the satellite, the fixed-mix strategy, and the DCS

	Maximum drawdown	99% VaR over a month	3-month trailing return 1st percentile	12-month trailing return 1st percentile	Calmar ratio
Core	0%	-0.04%	0.11%	1.34%	NA
Satellite	54.34%	12.57%	-21.91%	-42.06%	0.15
DCS	9.44%	3.93%	-6.16%	-7.07%	0.73
Fixed-mix	10.00%	2.17%	-3.71%	-7.17%	0.51

On the whole, average returns per unit of drawdown risk (Calmar ratio) for the dynamic strategy are much greater than those of the fixed-mix. The difference stems from the ability of the dynamic strategy to keep downside risk under control all while allowing significant access to the upside potential of the satellite. Although the satellite portfolio has higher average returns (see exhibit 2), it also comes with a large amount of drawdown risk, thus making its Calmar ratio lower than that of the DCS. The fixed-mix strategy, which provides drawdown protection similar to that of the dynamic strategy, comes with much less access to the upside potential of the satellite and thus has a Calmar ratio lower than that of the DCS.

5. Access to Value and Momentum Premia with Downside Risk Control



5. Access to Value and Momentum Premia with Downside Risk Control

The findings from part 4 confirm the results of Amenc et al. (2010), who, with a different dataset and over a different time period, conclude that the DCS could offer better returns and at the same time limit the downside risk. The next step is to look into whether the DCS could be used to gain access to value and momentum premia. Keeping downside risk under control is, of course, even more important in strategies in which the investment universe is reduced to concentrate the portfolio in stocks with high exposure to value or momentum.

5.1. Construction of Value/ Momentum Strategies

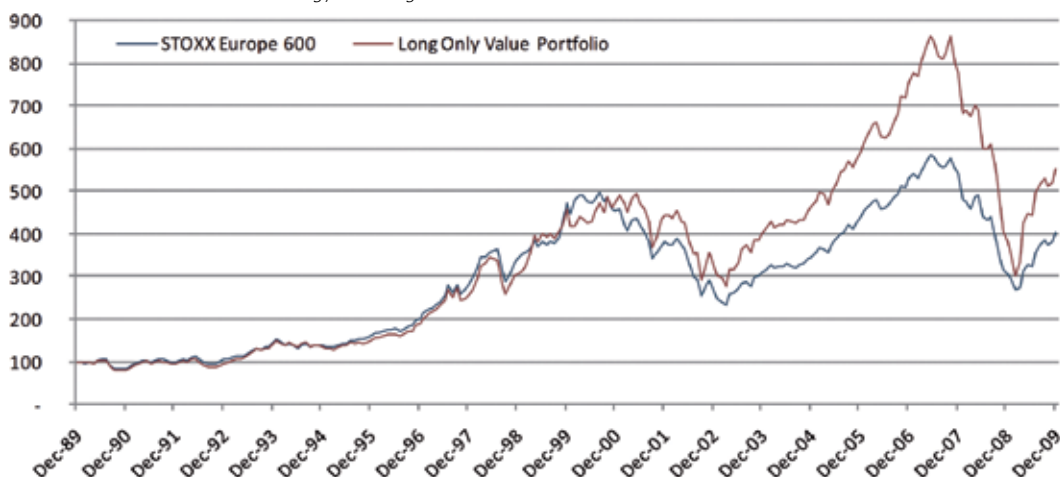
The value factor is computed from the fifteen STOXX Europe 600 sector sub-indices we initially select. We compute the aggregate book-to-market (BM) ratio of each index and then rank these BM ratios from highest to lowest. Every month, we go long the five indices with the highest BM ratios in the previous month. We can therefore create a long-only equally weighted value portfolio. Exhibit 4 shows the dynamics of the value strategy and the STOXX 600 in the sample period. On the whole, the value strategy

exhibited trends similar to those of the STOXX 600. Nevertheless, the value strategy managed higher absolute returns in market upturns, especially from 2002 to 2007. The finding indicates that our value strategy could lead to higher returns, although in 2008 it suffered a drawdown greater than that of the broad index, thus underscoring the risk of concentrating the portfolio in handful of value sectors.

We then build a momentum portfolio. To do so, we calculate the cumulative returns over the twelve previous months up to two months earlier (as in much of the literature, observations of the most recent returns are discarded to prevent short-term reversal effects). Once we have all the sectors' 12-2 month cumulative returns, we rank them from highest to lowest and go long the five indices exhibiting the highest cumulative returns in every month. Exhibit 5 compares the dynamics of the momentum strategy and the broad STOXX 600 from 1989 to 2009.

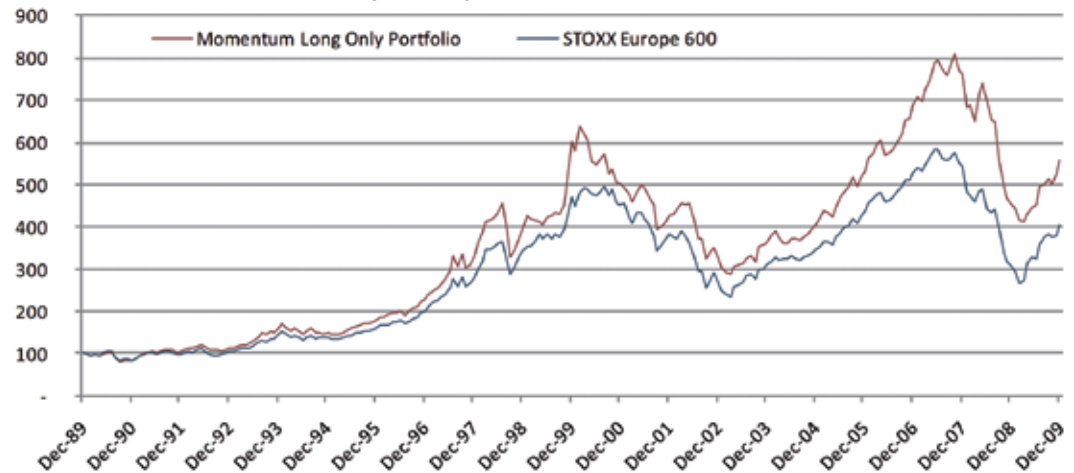
Similar to what we have seen for the value strategy, the momentum strategy generally posts higher absolute returns.

Exhibit 4: Evolution of the value strategy and the global index



5. Access to Value and Momentum Premia with Downside Risk Control

Exhibit 5: Evolution of the momentum strategy and the global index



The following table provides the risk and return statistics for the three portfolios. It is clear that both value and momentum strategies lead to higher returns and higher Sharpe ratios. The value strategy, however, involves greater downside risk, whereas the downside risk of the momentum strategy is similar to that of the STOXX 600.

Exhibit 6: Risk and return statistics of the STOXX 600, the value portfolio and the momentum portfolio

	Return	Volatility	Maximum drawdown	Sharpe ratio
STOXX 600	8.37%	16.43%	54.34%	0.39
Value portfolio	10.62%	20.24%	65.13%	0.43
Momentum portfolio	10.16%	17.38%	54.98%	0.47

A full value (or momentum) strategy usually involves going long the assets with the highest book-to-market ratios (the highest cumulative returns over the last twelve to two months) and going short the assets with the lowest book-to-market ratios (the lowest cumulative returns over the last twelve to two months). Thus, creating long-short portfolios makes the strategies even more effective. In our case, however, the results would be closer to reality as limits on short selling may make portfolio construction difficult.³

5.2 Results for the Value DCS

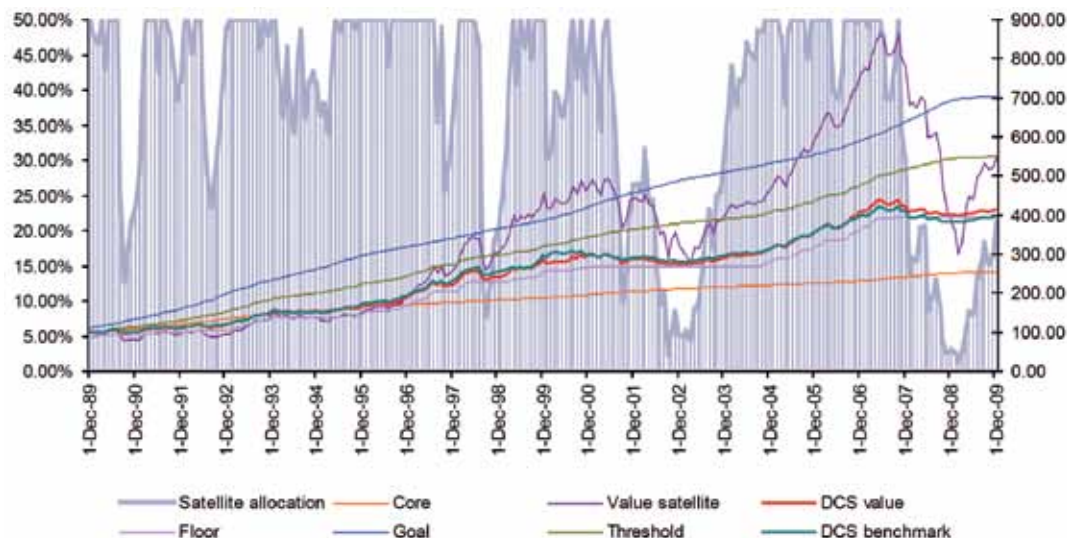
We now turn to the design of dynamic core-satellite portfolios. The value DCS portfolio is created with a core portfolio invested in cash and a long-only value portfolio (satellite portfolio). The parameters are the same as for the DCS benchmark portfolio: MDD floor of 10%, multiplier of the cushion at five, and cap return of twice the cash rate. Similarly—and by way of comparison—we construct a fixed-mix portfolio with an *ex post* maximum drawdown limit of 10%. Exhibit 7 shows the cumulative returns of the value DCS (bold red line) and of the DCS benchmark. We also show the core, the satellite, the floor, the threshold, and the goal.

It is clear that the value DCS strategy performs smoothly throughout the entire period. It reduces the fluctuation of the value satellite and limits downside risk. The overall absolute return is slightly higher than the DCS benchmark with the STOXX 600 as the satellite. This higher return suggests that the value DCS may help investors gain access to the value premium and, at the same time, limit the huge drawdown that may otherwise afflict the value portfolio.

3 - When the satellite portfolio is the STOXX Europe 600, practical implementation of the approach would not create any problems as the STOXX Europe 600 is a major traded index in Europe (Costandinides *et al.* 2011). However, value and momentum DCS strategies are underlain by sector indices rather than broad market indices. Costandinides *et al.* (2011) report that sector ETFs have a one-week trading volume from €5 million to more than €100 million, so, with ETFs, our sector strategies could be implemented for reasonably large investments. Moreover, it is usually argued that the relevant measure of ETF liquidity is the liquidity on the underlying basket rather than the volume of the ETF itself, as the ETF's creation and redemption process makes it possible, within the limits of the liquidity of the underlying instrument, to create additional units of shares or redeem shares.

5. Access to Value and Momentum Premia with Downside Risk Control

Exhibit 7: Evolution of the value DCS and its parameters



As expected, exhibit 8 shows that the returns of the value DCS portfolio are better than those of the core and the fixed-mix.

Exhibit 8: Risk and return statistics for the core, the satellite, the fixed-mix, the value DCS, and the DCS benchmark

	Return	Volatility	Sharpe ratio
Core	4.66%	0.81%	3.28
Value Satellite	10.62%	20.24%	0.43
DCS value	7.05%	6.41%	0.79
Fixed-mix value	5.09%	2.47%	1.25

It is clear, too, that the exposure to extreme risk of the value DCS is far lower than that of the value satellite.

5.3 Results for the Momentum DCS

Similarly, we construct the momentum DCS by combining the cash (core portfolio) with a new long-only momentum portfolio (satellite portfolio) described in 5.1. All the parameters are set to be the same. A fixed-mix strategy serves as a reference.

Exhibit 10 shows the cumulative returns of the momentum DCS strategy and of the DCS benchmark. As usual, the momentum DCS strategy (bold red line) is unaffected by market downturns but profits from upturns.

The risk and return statistics shown in exhibit 11 confirm the findings in the exhibit 10. The momentum strategy outperforms the fixed-mix by 2.39% annually.

Exhibit 9: Extreme risk statistics for the core, the satellite, the fixed-mix, the value DCS, and the DCS benchmark

	Maximum drawdown	99% VaR over a month	3-month trailing return 1st percentile	12-month trailing return 1st percentile	Calmar ratio
Core	0%	-0.04%	0.11%	1.34%	NA
Value Satellite	65.13%	15.07%	-25.88%	-49.99%	0.16
DCS value	9.76%	4.69%	-7.42%	-6.24%	0.72
Fixed-mix value	10.00%	1.95%	-3.32%	-6.46%	0.51

5. Access to Value and Momentum Premia with Downside Risk Control

Exhibit 10: Evolution of the momentum DCS and its parameters

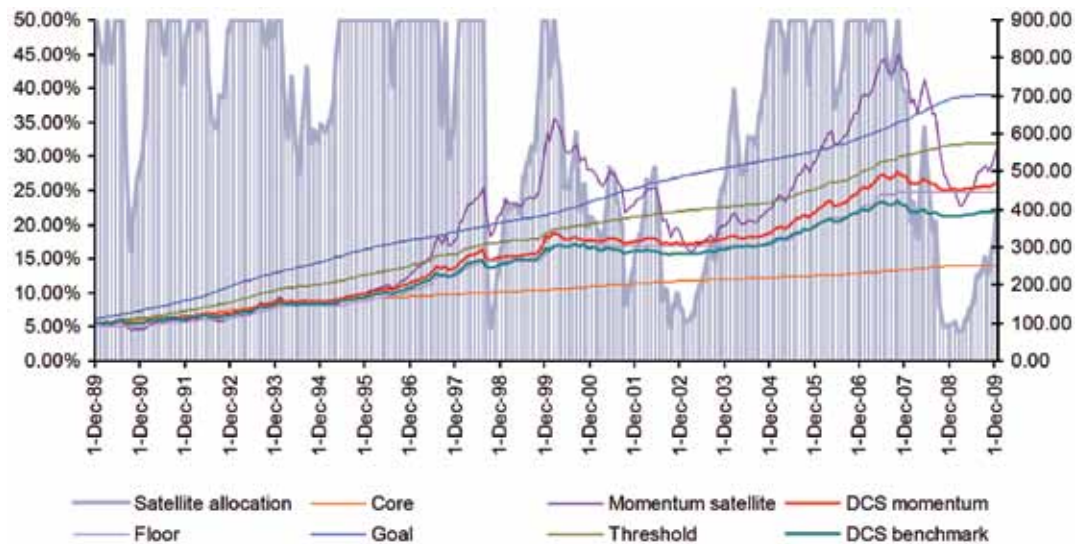


Exhibit 11: Risk and return statistics for the core, the satellite, the fixed-mix, the momentum DCS, and the DCS benchmark

	Return	Volatility	Sharpe ratio
Core	4.66%	0.81%	3.28
Momentum Satellite	10.16%	17.38%	0.47
DCS momentum	7.70%	6.24%	0.91
Fixed-mix momentum	5.31%	3.39%	0.98

We also compute extreme risk statistics for these portfolios and find that the momentum DCS strategy not only significantly reduces the downside risk the satellite portfolio is exposed to (in terms of all risk measures shown in the exhibit 12) but also improves the overall extreme risk/reward ratio (the Calmar ratio) significantly. The momentum long-only DCS strategy is

attractive because it posts the high returns of the momentum strategy and, at the same time, keeps exposure to risk under control.

5.4 Downside Risk Management for Value/Momentum Strategies

5.4.1 Value/Momentum Strategies Are Much More Concentrated than the Broad Market Index: Higher Downside Risk Is the Result

By design, the value and momentum strategies are more highly concentrated, as they are built on a handful of sectors (five, in our case). The result is greater exposure to downside risk (see the first three rows of exhibit thirteen). The maximum drawdown of the value strategy is nearly two-thirds of peak portfolio wealth. The maximum

Exhibit 12: Extreme risk statistics for the core, the satellite, the fixed-mix, the momentum DCS, and the DCS benchmark

	Maximum drawdown	99% VaR over a month	3-month trailing return 1st percentile	12-month trailing return 1st percentile	Calmar ratio
Core	0%	-0.04%	0.11%	1.34%	NA
Momentum Satellite	54.98%	14.08%	-24.12%	-39.76%	0.18
DCS momentum	9.25%	4.09%	-5.97%	-6.81%	0.83
Fixed-mix momentum	10.00%	2.82%	-4.73%	-7.68%	0.53
DCS Benchmark	9.44%	3.93%	-6.16%	-7.07%	0.73

5. Access to Value and Momentum Premia with Downside Risk Control

drawdown of the momentum strategy is slightly greater than that of the STOXX 600. The shortfall probability is the probability of experiencing a maximum drawdown that breaches the 10% limit. Although it has the largest maximum drawdown, the value strategy, interestingly, has the lowest shortfall probability, whereas the momentum strategy, despite its smaller maximum drawdown, has the highest. This finding implies that the extreme losses of the value strategy are larger but less frequent than those of the momentum strategy. The higher downside risk of strategic portfolios (value and momentum) are also shown by the one-month 99% Value at Risk, which is 15% for value and 14% for momentum but 12.6% for the STOXX 600. As for the trailing returns, the value strategy has constantly higher extreme losses in both the short term and the long term than the broad market index does. The momentum strategy, on the contrary, has higher short-term but lower long-term extreme drawdown than the broad market index does. On the whole, the value strategy is exposed to greater downside risk as a result of its more highly concentrated portfolios. The momentum strategy is also riskier in the short term, but, for the sample we study here, it is less prone to drawdown over the longer term.

5.4.2 The DCS Approach Reduces Downside Risk

Although the value and momentum strategies offer attractive returns, portfolio construction should also take into account the downside risks they are exposed to. In our study, the dynamic core-satellite approach can be taken to reduce extreme risk and possibly to gain an additional premium from the value and momentum factors. We could easily conclude (see exhibit 13) that, by all measures, the DCS approach greatly reduces downside risk. All three DCS portfolios respect the 10% limit on maximum drawdown and have a one-month 99% VaR of less than 5%. The first percentiles of trailing returns are also significantly reduced. In addition, both the short-term and the long-term trailing returns are reduced to around -7 to -6%. Higher Calmar ratios mean that, for about the same drawdown risk, portfolios achieve higher returns.

Exhibit 13: Summary of downside risk exposure for satellite portfolios and DCS portfolios

	Maximum drawdown	Shortfall probability	99% VaR over a month	3-month trailing return 1st percentile	12-month trailing return 1st percentile	Calmar ratio
STOXX 600	54.34%	43.75%	12.57%	-21.91%	-42.06%	0.15
Value	65.13%	36.25%	15.07%	-25.88%	-49.99%	0.16
Momentum	54.98%	50.00%	14.08%	-24.12%	-39.76%	0.18
DCS STOXX	9.44%	0	3.93%	-6.16%	-7.07%	0.73
DCS value	9.76%	0	4.69%	-7.42%	-6.24%	0.72
DCS momentum	9.25%	0	4.09%	-5.97%	-6.81%	0.83

6. Conclusion



6. Conclusion

In this paper, we analyse the performance of risk-controlled dynamic asset allocation strategies. In addition to exposure to broad equity indices, we analyse exposure to the value and momentum strategies. We find that these investment strategies alone could achieve higher returns but are exposed to high extreme risk because they consist of equity portfolios that are concentrated in the sectors with the highest value or momentum exposure. Combining these strategies with the DCS approach, however, dopes portfolio returns and, at the same time, keeps downside risk in check. Exchange-traded funds on sectors rather than on stocks can be used to put these strategies into effect; ETFs would also greatly facilitate the shifts—required by dynamic strategies—from core to satellite. The analysis in this paper can be extended in different ways. The paper addresses value and momentum effects, the effects, after all, most widely used in equity markets. It would be natural, however, to examine the inclusion of other sector-based strategies in a risk-controlled approach. It would also be interesting to identify the benefits, if any, of taking a DCS approach to gaining risk-controlled exposure to factors—term and default risk premia, for instance—in other asset classes.

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About EDHEC-Risk Institute

Founded in 1906, EDHEC is one of the foremost French business schools. Accredited by the three main international academic organisations, EQUIS, AACSB, and Association of MBAs, EDHEC has for a number of years been pursuing a strategy for international excellence that led it to set up EDHEC-Risk in 2001.

With sixty-six professors, research engineers, and research associates, EDHEC-Risk has the largest asset management research team in Europe.

The Choice of Asset Allocation and Risk Management

EDHEC-Risk structures all of its research work around asset allocation and risk management. This issue corresponds to a genuine expectation from the market.

On the one hand, the prevailing stock market situation in recent years has shown the limitations of diversification alone as a risk management technique and the usefulness of approaches based on dynamic portfolio allocation.

On the other, the appearance of new asset classes (hedge funds, private equity, real assets), with risk profiles that are very different from those of the traditional investment universe, constitutes a new opportunity and challenge for the implementation of allocation in an asset management or asset-liability management context.

This strategic choice is applied to all of the Institute's research programmes, whether they involve proposing new methods of strategic allocation, which integrate the alternative class; taking extreme risks into account in portfolio construction; studying the usefulness of derivatives in implementing asset-liability management approaches; or orienting the concept of dynamic "core-satellite" investment management in the framework of absolute return or target-date funds.

An Applied Research Approach

In an attempt to ensure that the research it carries out is truly applicable, EDHEC has implemented a dual validation system for the work of EDHEC-Risk. All research work must be part of a research

programme, the relevance and goals of which have been validated from both an academic and a business viewpoint by the Institute's advisory board. This board is made up of internationally recognised researchers, the Institute's business partners, and representatives of major international institutional investors. Management of the research programmes respects a rigorous validation process, which guarantees the scientific quality and the operational usefulness of the programmes.

Six research programmes have been conducted by the centre to date:

- Asset allocation and alternative diversification
- Style and performance analysis
- Indices and benchmarking
- Operational risks and performance
- Asset allocation and derivative instruments
- ALM and asset management

These programmes receive the support of a large number of financial companies. The results of the research programmes are disseminated through the EDHEC-Risk locations in London, Nice, and Singapore.

In addition, EDHEC-Risk has developed a close partnership with a small number of sponsors within the framework of research chairs or major research projects:

- Regulation and Institutional Investment, *in partnership with AXA Investment Managers*
- Asset-Liability Management and Institutional Investment Management, *in partnership with BNP Paribas Investment Partners*
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EDHEC-Risk Institute: Key Figures, 2009-2010

Nbr of permanent staff	66
Nbr of research associates	18
Nbr of affiliate professors	6
Overall budget	€9,600,000
External financing	€6,345,000
Nbr of conference delegates	2,300
Nbr of participants at EDHEC-Risk Indices & Benchmarks seminars	582
Nbr of participants at EDHEC-Risk Institute Risk Management seminars	512
Nbr of participants at EDHEC-Risk Institute Executive Education seminars	247

About EDHEC-Risk Institute

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www.edhec-risk.com/Aeducation/PhD_Finance

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www.edhec-risk.com/indexes/pure_style

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About Amundi ETF

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