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ETFs in Core-Satellite Portfolio Management

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Outline

- Introduction
- Benefits of Core-Satellite Portfolio Management
- Core-Satellite Portfolio Management with ETFs
- Designing Completeness Portfolios with ETFs
- Conclusions

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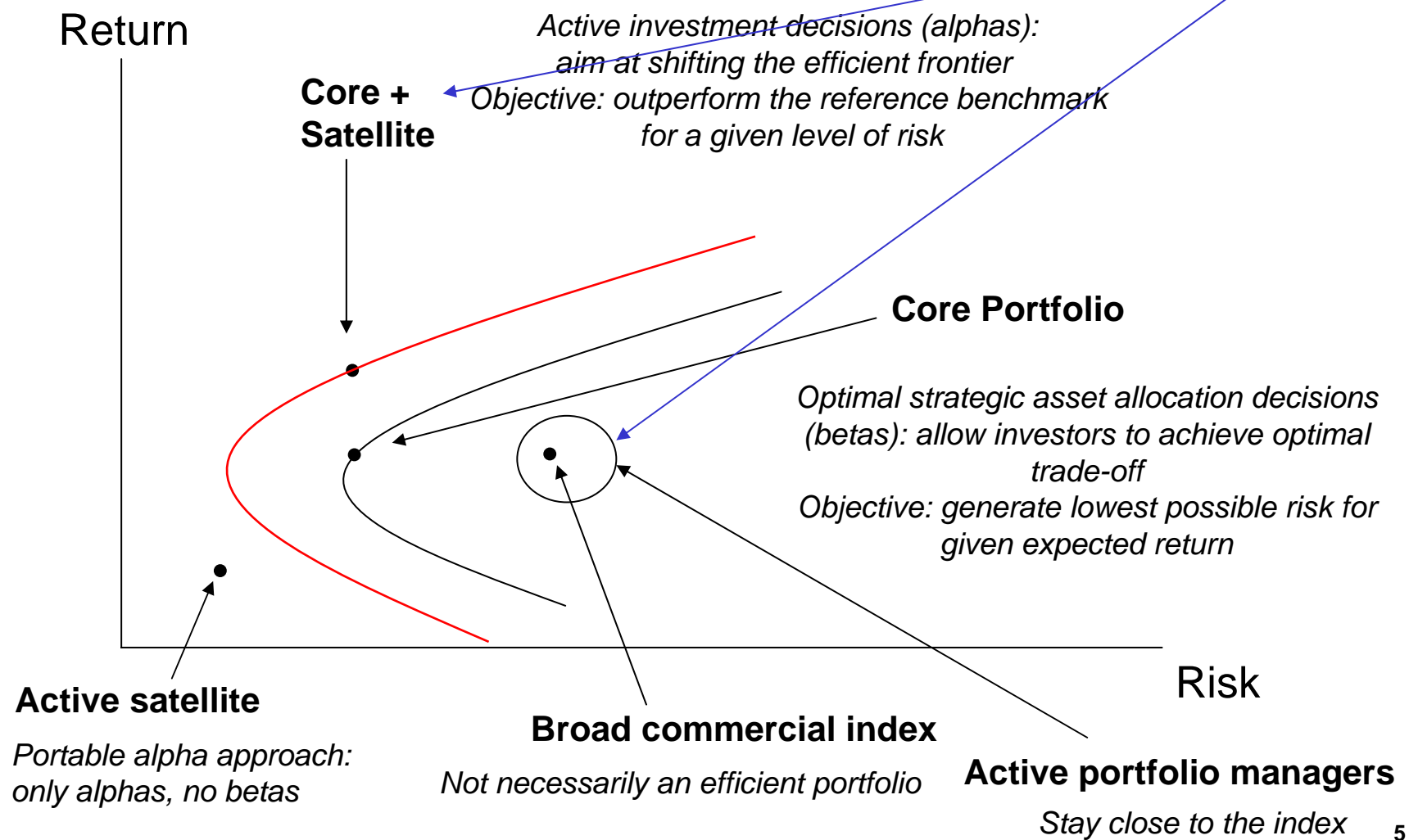
Introduction

What Added Value for Asset Management?

- Due to tight tracking error constraints with respect to commercial indices, most traditional active managers are mostly passive.
- As a result, there is no clear distinction between
 - Designing an efficient benchmark;
 - Generating outperformance
- A paradigm change is taking place with the ***core-satellite approach***.
- This approach advocates a clear separation between
 - Beta management (efficient core portfolio);
 - Alpha management (actively managed satellites).

Introduction

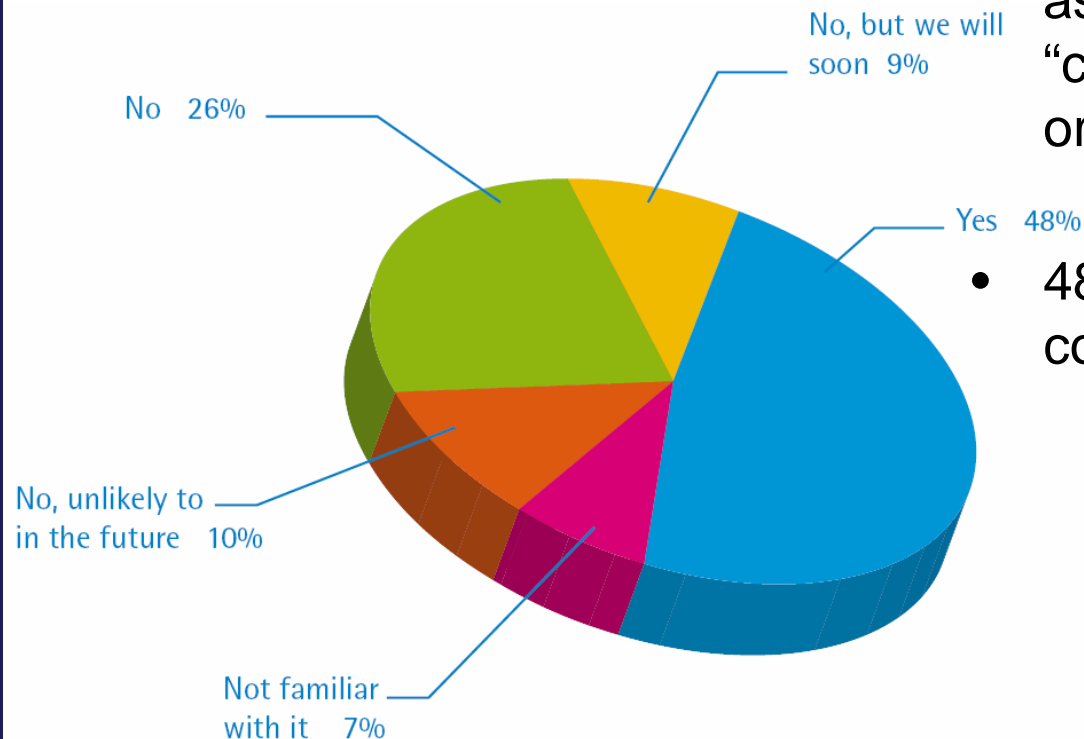
Here and There



Introduction

Adoption of Core-Satellite Approach

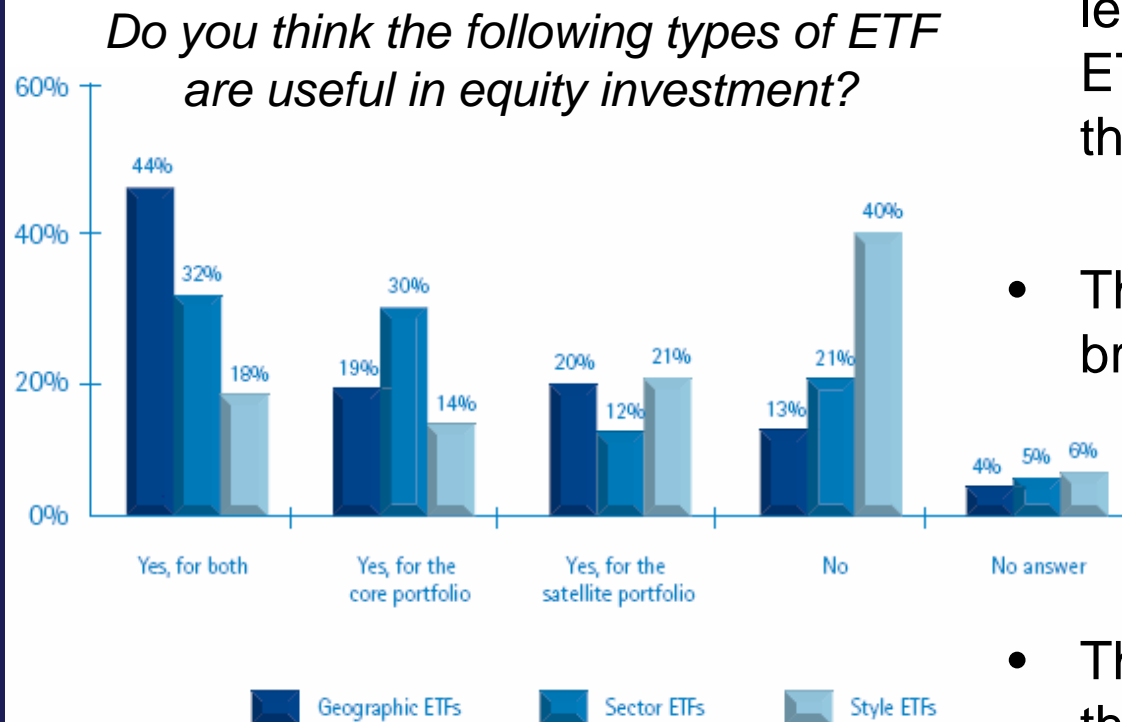
Have you implemented (or are you going to implement) a "core-satellite"-type organization of your allocation?



- 9% of European investors and asset managers implement a “core-satellite”-type organization in the near future;
- 48% are currently using the core-satellite approach.

Introduction

Dominance of Broad Market Indices



Source: EDHEC European ETF Survey 2006

- Style and Sector ETFs are less popular than geographic ETFs, especially for use in the core portfolio.
- This points to a dominance of broad market indices.
- This is surprising given that the academic literature has widely concluded on the importance of style and industry factors.

Introduction

Use of ETFs in Asset Allocation Decisions

- ETFs allow investors to gain an exposure to a wide range of asset classes and styles.
- This allows them to implement efficient and highly customised asset allocation decisions.
- Ease of trading in ETFs allows for the implementation of highly dynamic strategies.
- This presentation shows how ETFs can actively be used to add value above and beyond basic tracking of broad market indices (“passive management”).

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Benefits of Core-Satellite Portfolio Management

Betas Versus Alphas

- Traditional active management does not favour a clear distinction between:
 - Beta management (“passive management”, normal returns).
 - Alpha management (“active management”, abnormal returns).
- Assuming a single-factor model (CAPM), an active manager’s performance can be decomposed into:

$$E(R_{i,t}) = \underbrace{r_{f,t} + \beta_i [E(R_{M,t}) - r_{f,t}]}_{\text{normal expected return}} + \underbrace{\alpha_i}_{\text{abnormal expected return}}$$

- More generally, abnormal return is expected excess return in addition to reward from exposure to systematic risk factors.

Benefits of Core-Satellite Portfolio Management

Most Active Managers are Mostly Passive!

- Two polar cases:
 - In case of a purely passive investment strategy ($R_{i,t} = R_{M,t}$), the performance is only based on beta management.
 - In case of a market (factor)-neutral hedge fund (beta=0), performance beyond risk-free rate only emanates from active bets.
- Overall, a traditional active manager with a 5% tracking error constraint is 95% passive!
- Such a confusing “mélange des genres” is likely to be costly and inefficient.
- We have evidence that clearly separating out alpha and beta management pays.

Benefits of Core-Satellite Portfolio Management

The Economics of the Core-Satellite Approach

- The core-satellite approach:
 - Advocates a clear separation of a core portfolio managed passively from one or more very actively managed satellites.
 - Allows for
 - i) a better distinction between good and poor performers;
 - ii) manager diversification in the satellite portfolio;
 - iii) greater transparency and cost-efficiency.
- Example of cost reduction for an “International Equity” portfolio (€100m, 4% tracking error).
- Traditional active approach – expensive : 100bp = €1m.

Benefits of Core-Satellite Portfolio Management

The Economics of the Core-Satellite Approach

- Core-Satellite approach - cost : 28bp = €280,000
 - Example : to obtain a core-satellite with a 4% tracking error, and to give enough flexibility to the active manager (allow for instance a 20% tracking error), 20% of the capital is allocated to the satellite and 80% to the core portfolio.
 - Overall management costs: $10 \times 80\% + 100 \times 20\% = 28\text{bp}$.

	“Core”	“Satellite”	Global
Weight	80%	20%	100%
Tracking Error	0%	20%	4% <small>(0%x.80+20%x.20)</small>
Management Fees	10 bps	100 bps	28 bps <small>(10x.80+100x.20)</small>

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Core-Satellite Portfolio Management with ETFs

ETFs in the Core

- A broad market index (DJ Euro Stoxx, S&P 500) may constitute the core portfolio.
- Such indices, however, are not necessarily efficient portfolios.
- An alternative is to hold an optimal portfolio of sector-, style or country indices.
- ETFs provide a cost-efficient and liquid support for constructing such core-portfolios.
- Index ETFs provide exposure to diversified baskets of stocks, thus avoiding (implicit or explicit) stock selection decisions.

Core-Satellite Portfolio Management with ETFs

ETFs in the Satellite

- ETFs may be employed in **tactical asset allocation** strategies.
 - Sector rotation and style rotation strategies have been shown to provide solid opportunities for outperformance.
 - Likewise, rotation strategies between segments of the bond markets (maturity segments, credit risk segments) have been proposed.
- ETFs allow investors to capture the performance related to **risk premia** of certain asset classes (small-cap stocks, emerging market stocks, value stocks, commodity indices, high yield bonds, ...).
- Such performance-seeking portfolios of ETFs can also be used as satellite portfolios.

Core-Satellite Portfolio Management with ETFs

Efficient Core Portfolios with ETFs: Preview

Optimal allocation between ETFs: Techniques in empirical examples across different datasets.

DJ Euro Stoxx index

vs. optimal allocation between DJ Euro Stoxx style indices (Minimum VaR)

MSCI ECI Overall bond index

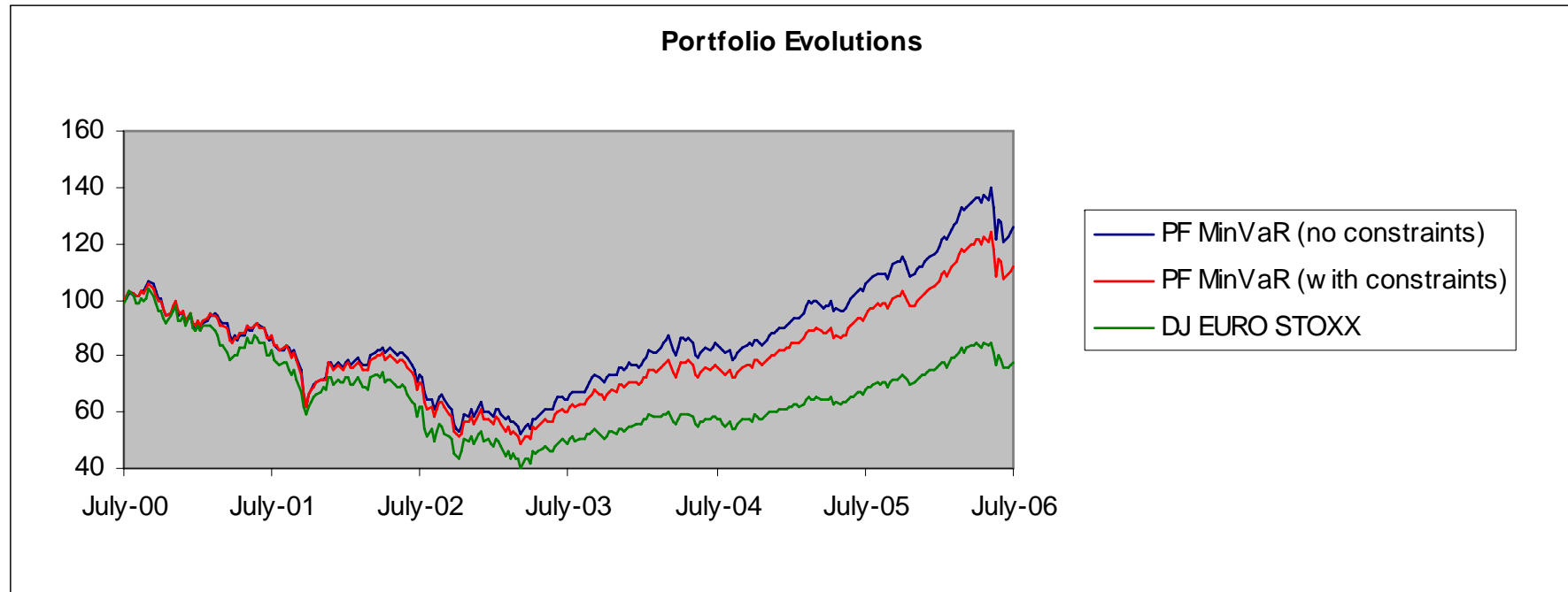
vs. optimal allocation between maturity segments (Minimum VaR)
and credit rating segments

MSCI World Index

vs. optimal allocation among regional indices (Minimum Variance
s.t. TE constraint)

Core-Satellite Portfolio Management with ETFs

Optimal Equity Allocation (Min. VaR)



This graph shows the results of min-VaR optimized equity portfolio, compared with the DJ Euro Stoxx on the period from July 2000 to June 2006. The opportunity set used to construct the equity portfolio was made of the four following style indexes: the DJ Euro Stoxx Small index, the DJ Euro Stoxx MidCap index, the DJ Euro Stoxx TM Large Value index and the DJ Euro Stoxx TM Large Growth index. We first performed an optimisation without imposing constraints on the style indexes weights. In a second step, we performed the same process of optimisation, imposing minimum and maximum constraints on each style index, such that each one got a minimum weight of 10% and a maximum weight of 50% in the portfolio.

Core-Satellite Portfolio Management with ETFs

Optimal Equity Allocation (Min. VaR)

<i>from 07/2000 through 06/2006</i>	Avg. Return *	Final Wealth ($W_0=100$)	Max. Draw- down (in %)	Volat. (in %)*	Down- side Risk (in %)*	Mod. VaR(in %)****	Sharpe Ratio*/ **	Ret* / VaR	Sortino Ratio */**
PF MinVaR (no constraints)	5.21%	120.74	50.58%	17.50%	14.11%	4.20%	0.18	1.24	0.23
PF MinVaR (with constraints)	3.37%	107.86	54.11%	18.24%	14.47%	4.37%	0.08	0.77	0.09
DJ EURO STOXX	-2.05%	75.60	61.86%	21.27%	15.90%	4.97%	-0.19	-0.41	-0.25
Risk reduction (no constraints) vs DJ Euro Stoxx			18.22%	17.73%	11.30%	15.57%			
Risk reduction (with constraints) vs DJ Euro Stoxx			12.53%	14.26%	9.03%	12.15%			

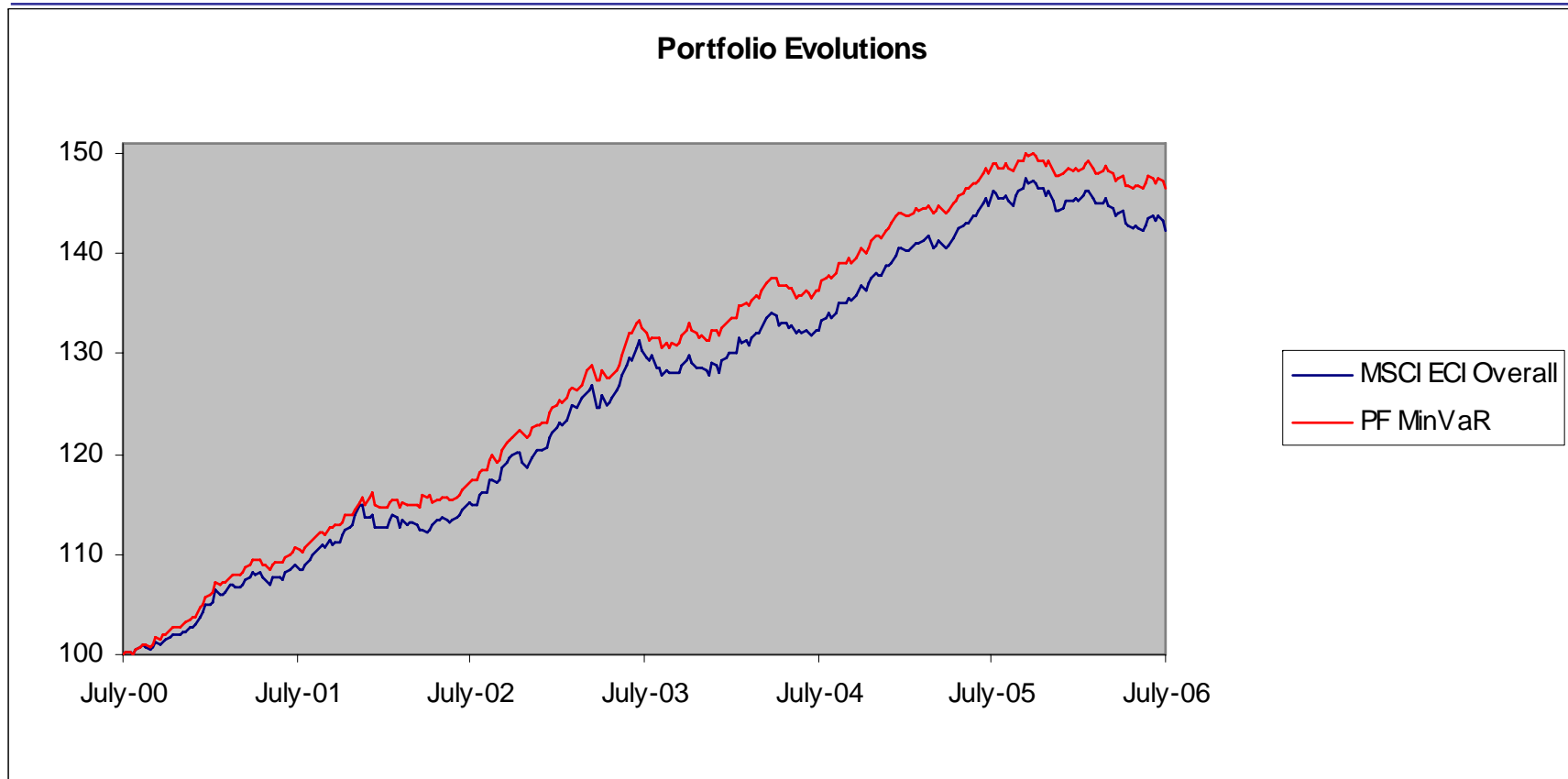
* *annualized statistics are given*

** *risk free rate and MAR are fixed at 2%*

*** *non-annualized 5%-Cornish-Fisher-percentiles are given*

Core-Satellite Portfolio Management with ETFs

Optimal Bond Allocation (Min. VaR)



This graph shows the results of min-VaR optimized bond portfolio, compared with the MSCI ECI Overall Index on the period from July 2000 to June 2006. The opportunity set used to construct the bond portfolio was made of : the MSCI ECI Government 3-5Y index, the MSCI ECI Government 7-10Y index, the MSCI Corp. AAA index and the MSCI ECI Corp. BBB index. Optimisation was performed imposing minimum and maximum constraints on each index, such that the optimized portfolio was invested in Government indexes with a minimum of 50% and invested in High Yield (BBB) index with a maximum of 20%. In addition, each of the two Government sub-indices was submitted to a minimum constraint of 10%

Core-Satellite Portfolio Management with ETFs

Optimal Bond Allocation (Min. VaR)

<i>from 07/2000 through 06/2006</i>	Average Return*	Final Wealth ($W_0=100$)	Maximum Drawdown (in %)	Volatility (in %)*	Down- side Risk (in %)*	Modified VaR (in %)**	Sharpe Ratio */**	Return* /VaR	Sortino Ratio*/**
PF MinVaR	6.58%	146.45	2.40%	2.57%	1.69%	0.48%	1.78	13.59	2.70
MSCI ECI OVERALL	6.08%	142.28	3.52%	3.04%	2.10%	0.63%	1.34	9.71	1.94
Risk reduction			31.95%	15.25%	19.54%	22.71%			

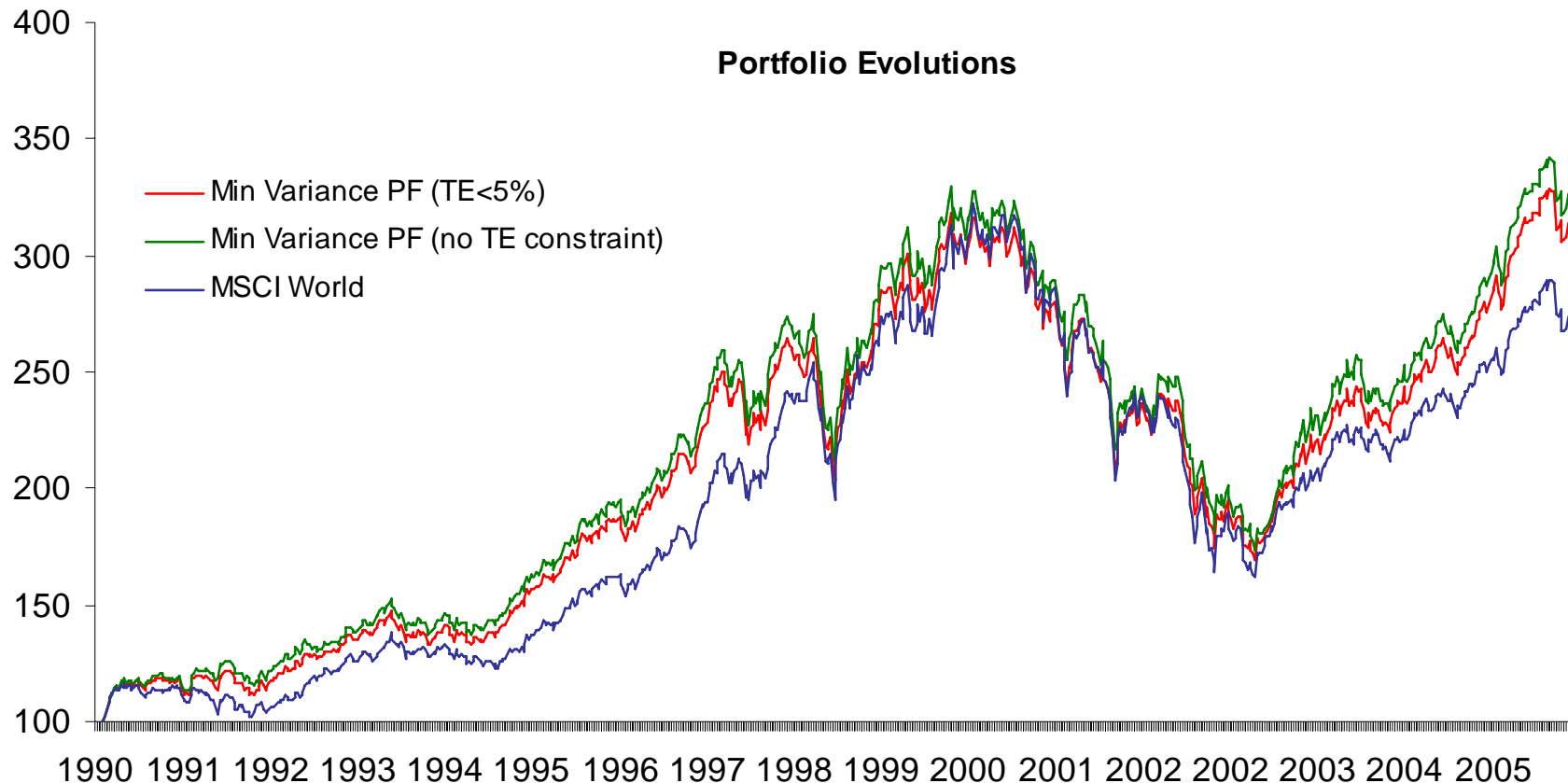
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Core-Satellite Portfolio Management with ETFs

Min.Variance Int'l Allocation with Tracking Error Constraint



This graph shows the results of min Variance optimized portfolio, compared with the MSCI World Index on the period from January 1991 to June 2006. The portfolio allocation is optimised by minimizing the in-sample portfolio variance subject to a tracking error constraint of 5%, using weekly data on 6 indices for the period extending from January 1988 to June 2006. Successive optimisations are performed every six months, using 3 years of data (rolling window analysis). the chosen benchmark is MSCI World Index and the Opportunity set of sub-indices is made of five following MSCI regional indices: the AC Far East ex-Japan index, the Japan index, the North America index, the Europe ex-UK index and the Emerging Markets index, and of the FTSE 100 index

Core-Satellite Portfolio Management with ETFs

Min.Variance Int'l Allocation with Tracking Error Constraint

<i>from 01/1991 through 06/2006</i>	Avg. Return	Final Wealth ($W_0=100$)	Max. Draw- down (in %)	Volatility (in %)*	Down-side Risk (in %)*	Mod. VaR (in %)**	Sharpe- Ratio*/**	Info- Ratio*	Return */ VaR	Sorti no Ratio */**
Min Variance PF (TE<5%)	8.51%	313.91	46.80%	12.78%	9.06%	2.83%	0.51	0.06	3.01	0.72
Min Variance PF (no TE constraint)	8.80%	326.31	47.39%	12.90%	9.07%	2.86%	0.53	0.28	3.08	0.75
MSCI World	7.62%	273.42	49.60%	13.28%	9.56%	2.91%	0.42	0.42	2.62	0.59
Risk reduction Min Variance PF (TE<5%) vs MSCI World			5.64%	3.81%	5.29%	2.83%				
Risk reduction (no TE constraints) vs MSCI World			4.47%	2.91%	5.21%	1.90%				

* *annualized statistics are given*

** *risk free rate and MAR are fixed at 2%*

*** *non-annualized 5%-Cornish-Fisher-percentiles are given*

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Designing completeness portfolios

Aligning Satellite and Core Portfolios' Factor Exposures

- The composition of the active satellite should emanate from a focus on selecting the manager(s) with highest potential for generating alpha.
- Nothing guarantees that the resulting satellite portfolio will have the same factor exposure as that of the core of ETFs, which was designed to be optimal given investor's preference and constraints.
- Chances are that a naïve selection of active managers will lead to messing up the otherwise carefully designed factor exposure of the core portfolio.
- Two possible approaches can be followed to align the betas of the satellite with respect to the betas of the core portfolio:
 - ***Manager optimization***
 - ***Completeness portfolio***

Designing completeness portfolios

Optimal Manager Portfolio with Target Factor Exposure

- Formally, run an unconstrained regression of n managers with return vector r on K factors with return vector R

$$r_t = a + BR_t + \varepsilon_t; B = \Sigma_{rR} \Sigma_{RR}^{-1}; a = \mu_r - B\mu_R$$

- Optimization program with target factor exposure e

$$\underset{w}{\text{Min}} \text{Var} (r_p) = w' \Sigma_{rr} w$$

$$\text{s.t. } E(R_p) = w' \mu_r = m; w' 1_n = 1; Bw = e$$

$$\text{or } A' w = \theta \text{ with } A = (a, 1_n, B'); \theta' = (m, 1, e)$$

- Solution

- Multi-factor efficient portfolio (Fama (1996))
- See also Cochrane (1999)

$$w^* = \Sigma_{\varepsilon\varepsilon}^{-1} A (A' \Sigma_{\varepsilon\varepsilon}^{-1} A)^{-1} \theta$$

Designing completeness portfolios

Limits of the Approach

- It sometimes proves impossible to allocate funds to various active managers while satisfying the constraints of matching the core's portfolio factor exposure.
 - This can result from factor biases in active portfolios that can differ from those of the core.
 - For example, it is often argued that alpha can be more easily generated in the small cap universe, than in the large cap universe.

Designing completeness portfolios

Limits of the Approach

- Example:
 - Assume core allocation is Eurostoxx 50;
 - Use style analysis to estimate style exposure of core portfolio and 18 top active European managers selected on their alpha potential.

	<i>Euro Stoxx 50</i>	<i>18 top active European managers</i>		
		<i>Min</i>	<i>Max</i>	<i>Average</i>
Small Cap	0%	46%	100%	86%
Value	55%	0%	22%	3%
Growth	45%	0%	32%	11%

Based on MSCI style indices on the sample period 08/09/2002-07/29/2005.

- More generally, optimizing over manager allocation may not necessarily be a good solution in practice, even when feasible in theory, since it is usually costly to dynamically adjust the allocations to active managers.

Designing completeness portfolios

Completeness Portfolio Approach

- An alternative solution is to use a completeness portfolio approach.
 - As opposed to trying to optimize the composition of the manager's portfolio, select one convenient allocation (say, equally-weighted).
 - Then, invest in a completeness portfolio with biases intended to neutralize those of the satellite portfolio with respect to the core.

$$R_{Core}(t) = \sum_{k=1}^K w_{Core,k} R_k(t)$$

$$R_{Satellite}(t) = \sum_{k=1}^K w_{Satellite,k} R_k(t) + \alpha_{Satellite}(t)$$

$$R_{Completeness}(t) = \sum_{k=1}^K (w_{Core,k} - w_{Satellite,k}) R_k(t)$$

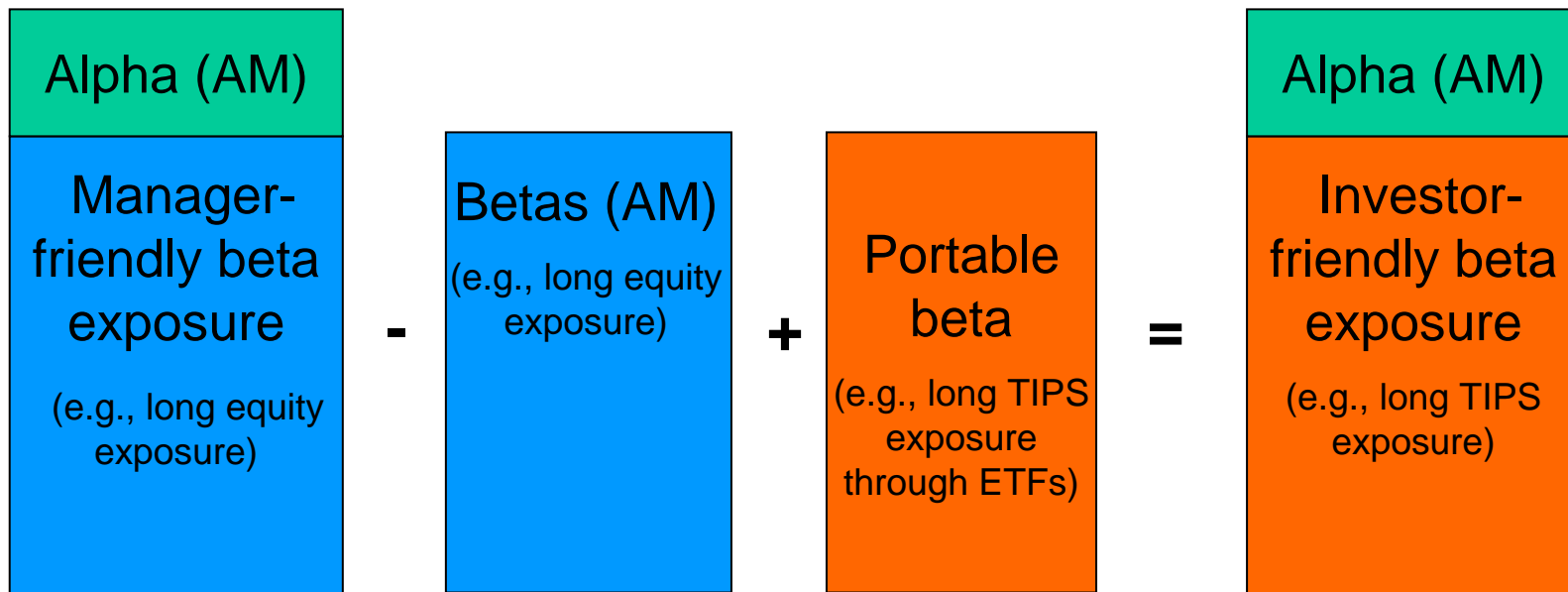
Designing completeness portfolios

From the Delivering to the Packaging of Alpha

- As outlined by the completeness portfolio approach, it is neither desirable nor necessary to tie together the generation of alpha and beta sources.
- The focus is increasingly shifting from the pure delivering to the packaging of alpha.
- As in any maturing industry, this is a shift from production to marketing:
 - Not only should active funds bring alpha; the alpha must also fit investors' need.
 - Investors active strategies for their alpha; they also need the betas to fit their needs.
- The aim is to obtain investor friendly beta exposure + portable alpha

Designing completeness portfolios

The Mechanics of Alpha and Beta Transport



- Alpha + Beta from an active manager (AM) can be separated.
- ETFs can be used to neutralise manager-friendly betas and replace them with investor-friendly betas (in particular since they can be sold short).

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Conclusions

- The core-satellite portfolio approach is now recognised for its advantages and used by a majority of institutional investors.
- ETFs offer a natural vehicle for implementing allocation strategies both in the core and in the satellite.
- An allocation between ETFs for segments of equity or bond markets offers significant risk reduction benefits.
- ETFs may also be used for aligning the risk factor exposure through a completeness portfolio approach.