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# **The Core-Satellite Approach: Adding Value to Asset Management**

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# Introduction

## *What Added Value for Asset Management?*

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- Most active managers are mostly passive
- There is no clear distinction between:
  - creating an efficient benchmark
  - creating outperformance
- A paradigm change is taking place in the ***core-satellite approach***
- This approach advocates a clear separation between:
  - a passively managed core portfolio
  - actively managed satellites.

# Outline

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

# 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

## *Betas Versus Alphas*

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- 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 the risk-free rate only emanates from active bets
- An active manager with a 5% tracking error constraint is 95% passive!
- We have evidence that clearly separating out alpha and beta management pays: such a confusing “mélange des genres” is likely to be costly and inefficient

# Benefits of Core-Satellite Portfolio Management

*Most Active Managers are Mostly Passive!*

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- 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 (passive strategy)

# Benefits of Core-Satellite Portfolio Management

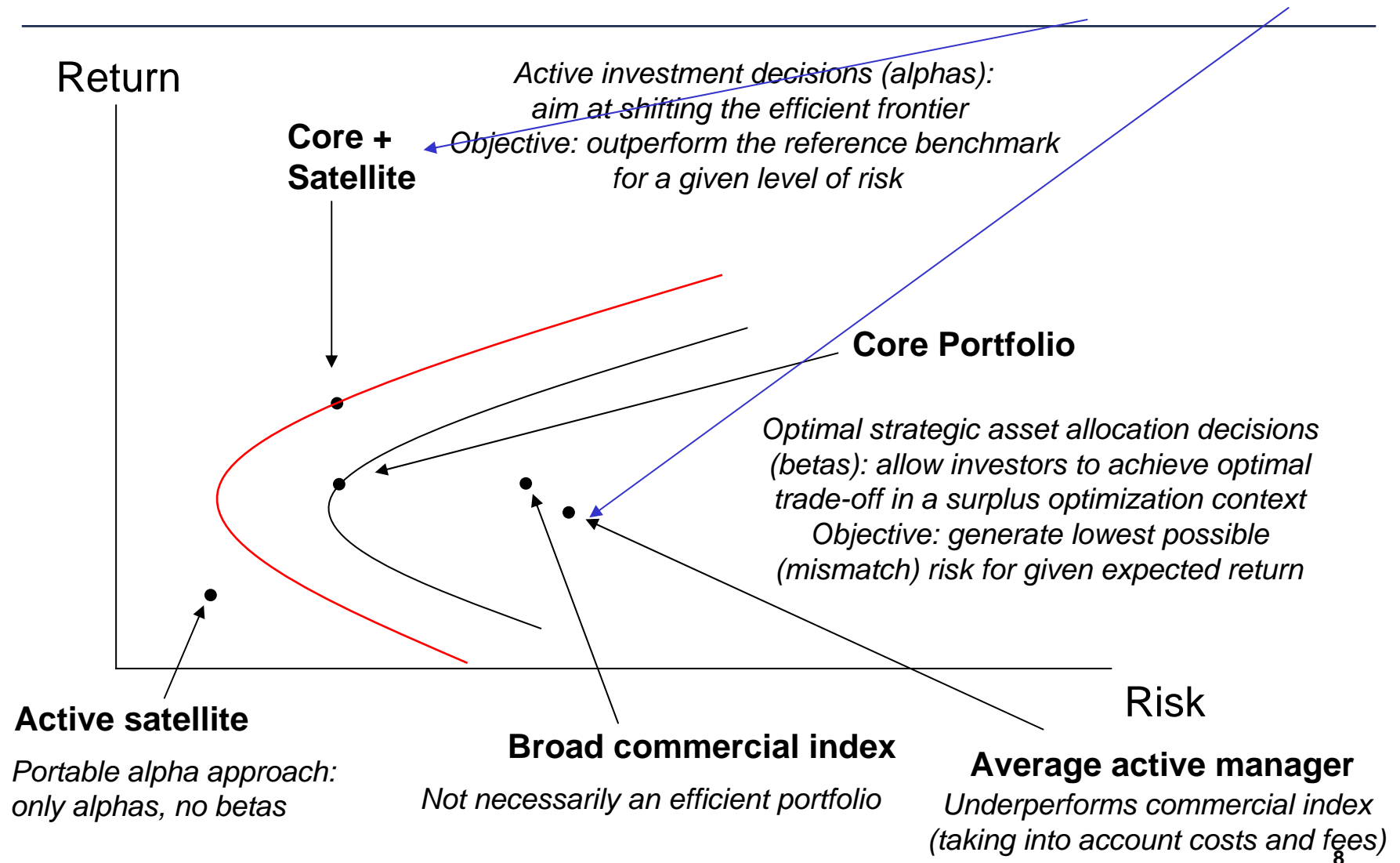
## *The Economics of the Core-Satellite Approach*

- Core-Satellite approach - cost : 28bp = €280,000
  - Ex: to obtain a core-satellite with a 4% tracking error, and to give enough flexibility to the active manager (allow a 20% tracking error for instance) 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%	<b>100%</b>
Tracking Error	0%	20%	<b>4%</b> (0% $\times$ .80+20% $\times$ .20)
Management Fees	10 bps	100 bps	<b>28 bps</b> (10 $\times$ .80+100 $\times$ .20)

# Benefits of Core-Satellite Portfolio Management

*Here and There*



# Core-Satellite Portfolio Management with ETFs

## *ETFs in the Core*

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- A broad market index (DJ Euro Stoxx, S&P 500) may constitute the core portfolio
- 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*

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- 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 make it possible to capture the outperformance linked to the **risk premia** of certain asset classes (small cap stocks, emerging market stocks, value stocks, commodity indices, high yield bonds, etc.)
- Such outperformance-seeking portfolios of ETFs constitute satellite portfolios

# Core-Satellite Portfolio Management with ETFs

## *Asset Allocation Examples: Preview*

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**Benefits of optimal allocation between ETFs:** Risk reduction obtained through allocation techniques in empirical examples across different datasets

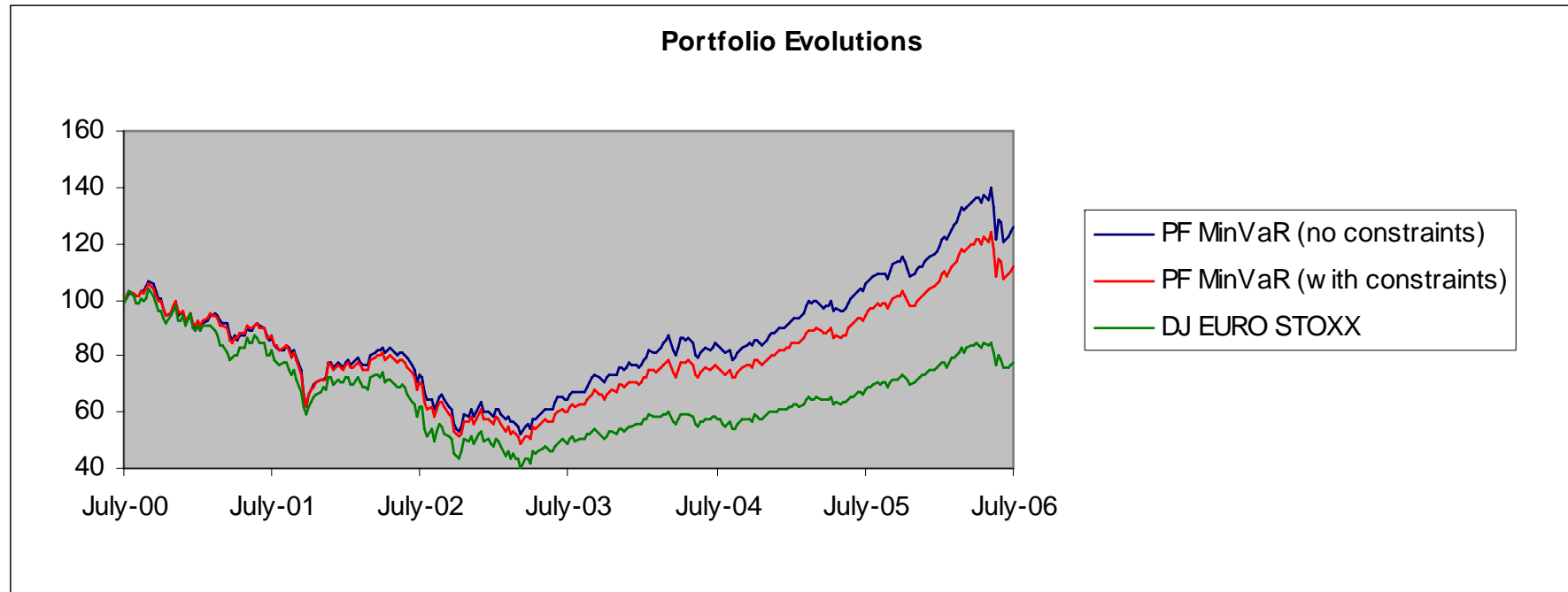
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Dataset	Risk Reduction	
	Vol.	VaR
<b>DJ Euro Stoxx index</b> vs. optimal allocation between DJ Eurostoxx style indices	<b>17.73%</b>	<b>15.57%</b>
<b>MSCI ECI Overall bond index</b> vs. optimal allocation between maturity segments and credit rating segments	<b>15.25%</b>	<b>22.71%</b>
<b>MSCI World Index</b> vs. optimal allocation among regional indices	<b>3.81%</b>	<b>2.83%</b>

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# Core-Satellite Portfolio Management with ETFs

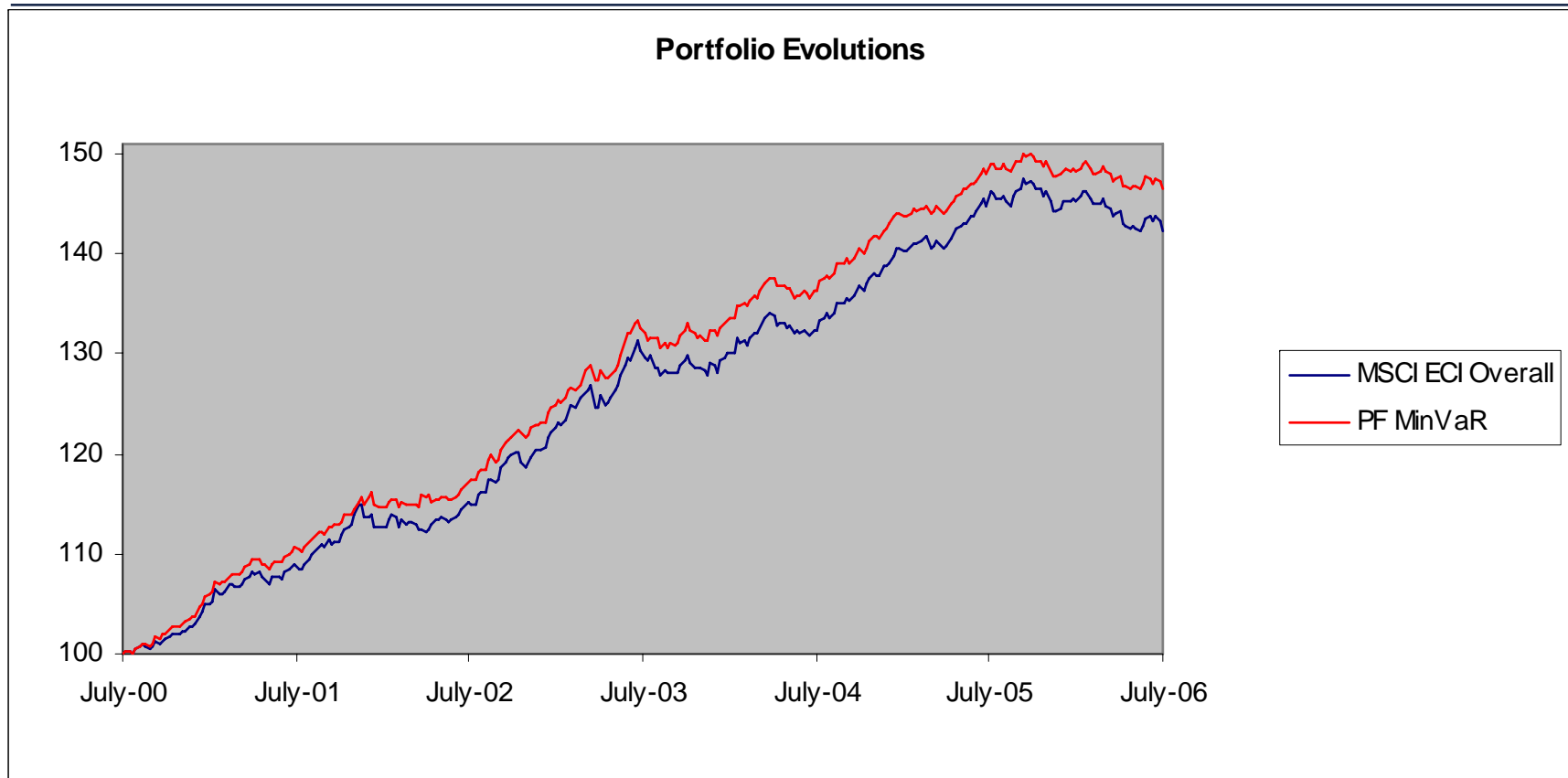
## *Optimal Equity Allocation (Min. VaR)*



*This graph shows the results of a min-VaR optimized equity portfolio, compared with the DJ Euro Stoxx for the period of July 2000 to June 2006. The opportunity set used to construct the equity portfolio was made up 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 index weights. We then performed the same process of optimisation, imposing minimum and maximum constraints on each style index, such that each one had a minimum weight of 10% and a maximum weight of 50% in the portfolio.*

# Core-Satellite Portfolio Management with ETFs

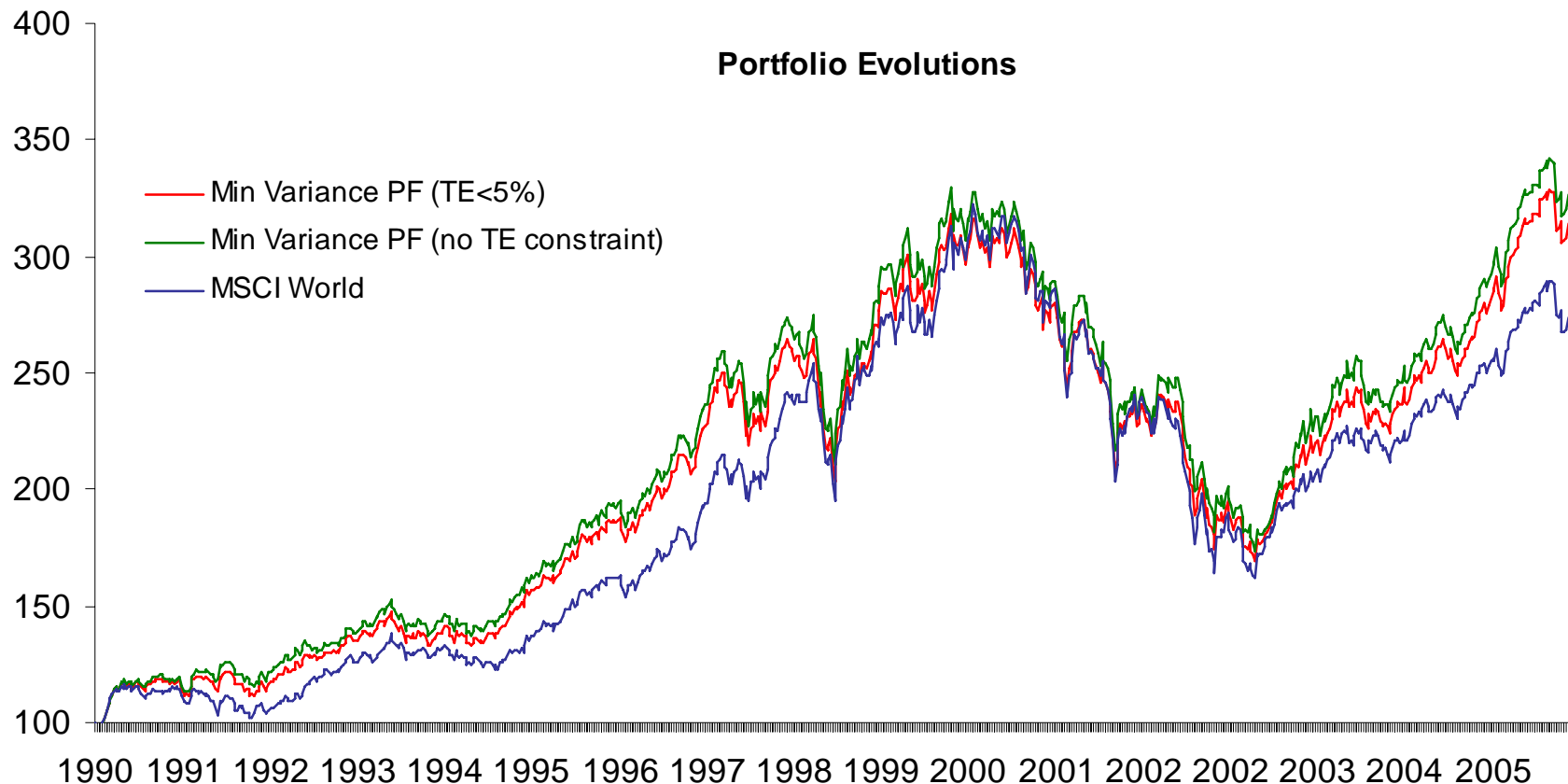
## *Optimal Bond Allocation (Min. VaR)*



*This graph shows the results of a min-VaR optimized bond portfolio, compared with the MSCI ECI Overall Index for the period of July 2000 to June 2006. The opportunity set used to construct the bond portfolio was made up 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 a minimum of 50% invested in Government indexes and a maximum of 20% invested in the High Yield (BBB) index. In addition, each of the two Government sub-indices was submitted to a minimum constraint of 10%.*

# Core-Satellite Portfolio Management with ETFs

## *Min.Variance Int'l Allocation with Tracking Error Constraint*



This graph shows the results of a min Variance optimized bond portfolio, compared with the MSCI World Index for the period of 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 the MSCI World Index and the Opportunity set of sub-indices is made up of the 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, as well as the FTSE 100 index.

# Designing completeness portfolios

## *Aligning Satellite and Core Portfolio Factor Exposures*

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- The composition of the active satellite should emanate from a focus on selecting the manager(s) with the 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 with 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*

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- 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*

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- 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 that 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

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

*Based on MSCI style indices for 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*

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- 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 Delivery to the Packaging of Alpha*

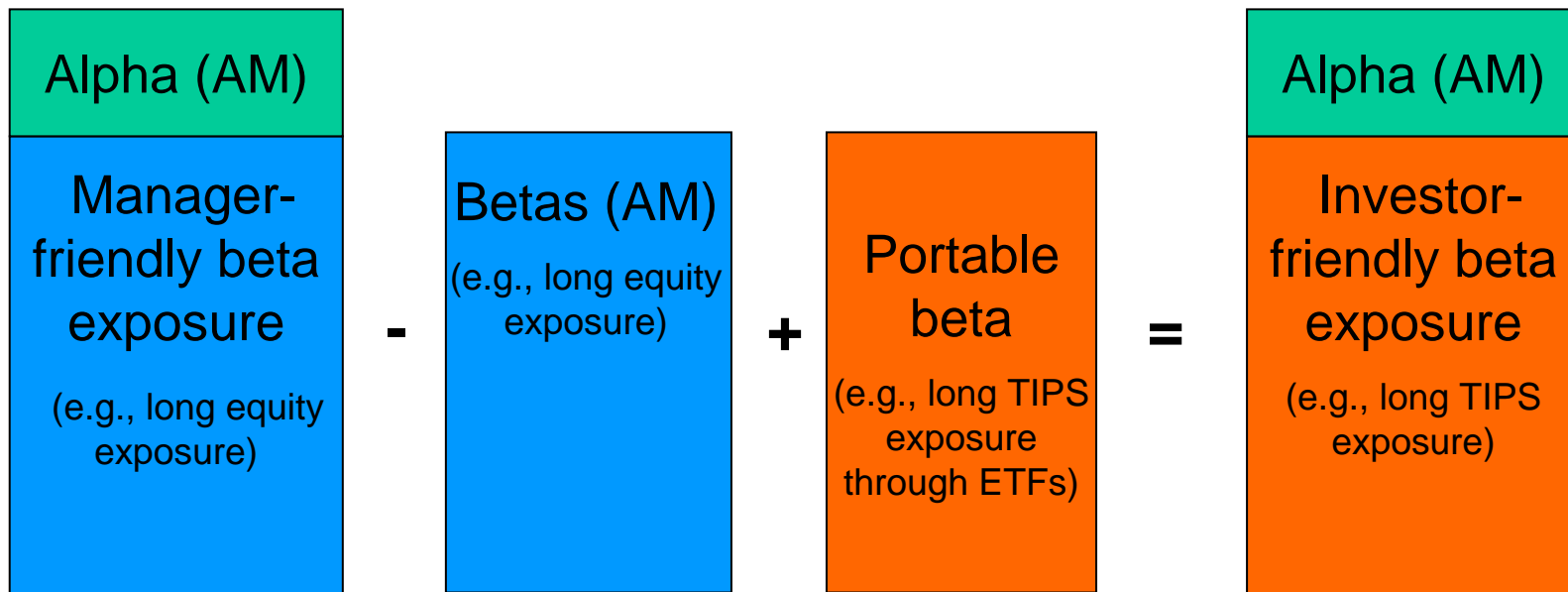
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- As outlined by the completeness portfolio approach, it is neither desirable nor necessary to tie together the generation of alpha and beta sources
- The focus is increasingly shifting from the pure delivery to the packaging of alpha
- As in any maturing 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*

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- 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)

## Conclusion

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- 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 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