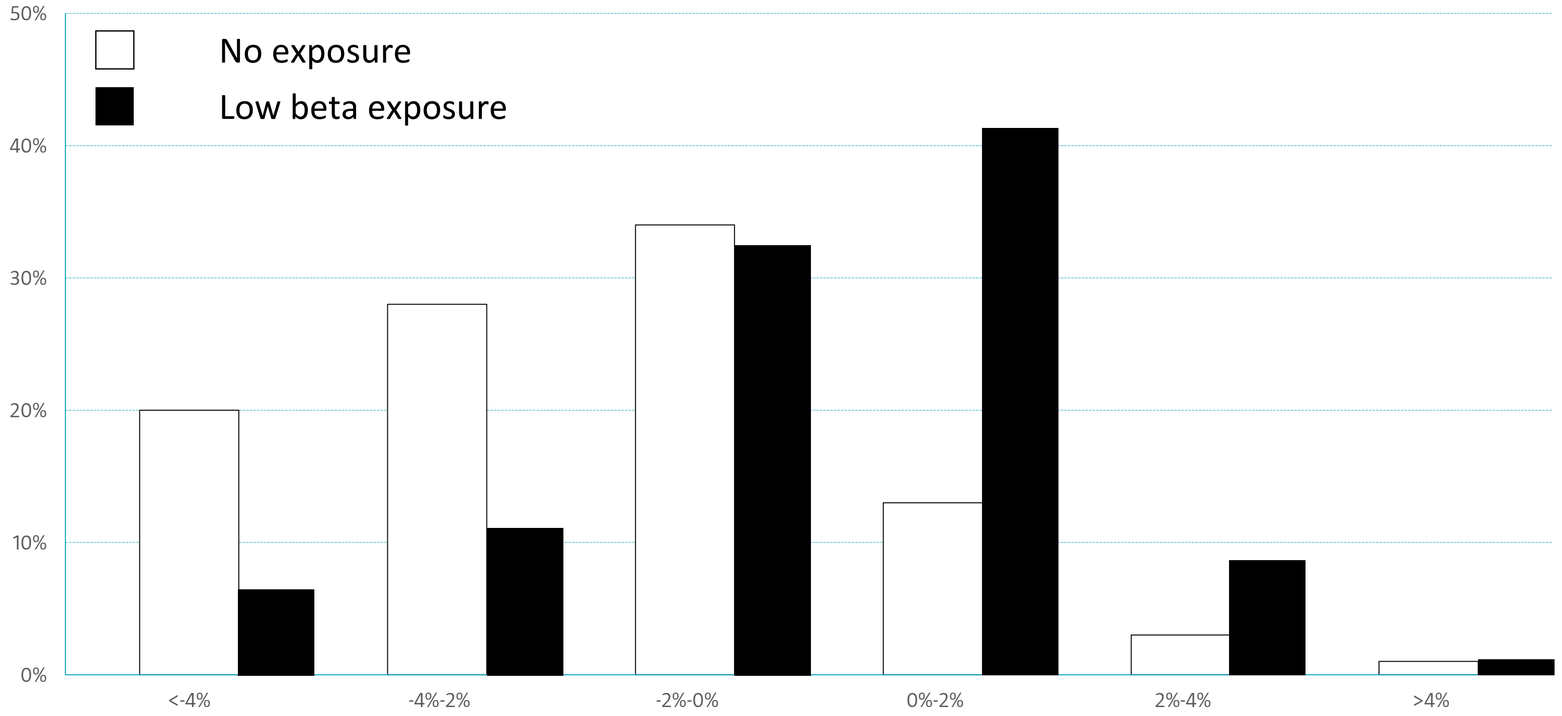
ROBECO

BETA RELEASE NEW ROBECO FACTOR EXPOSURE MONITOR

Joop Huij, PhD
Head of Factor Investing Research

For Professional Investors only

MOST MUTUAL FUNDS UNDERPERFORM,…



Academic Knowledge Dissemination in the Mutual Fund Industry: *Can Mutual Funds Successfully Adopt Factor Investing Strategies?*

EDUARD VAN GELDEREN AND JOOP HUIJ

New Insights Into the Implementation of Factor Investing

Eduard van Gelderen, Joop Huij, and Georgi Kyosev*

Abstract

In this paper we expand the study by van Gelderen and Huij (2014) in several ways: first, we augment their analyses with the new profitability and investments factors. Second, we investigate how investors respond to fund managers following factor investing strategies by analyzing fund flows. Third, next to U.S. equity data, we also use global equity data. Fourth, we employ the novel bootstrap approach put forward by Fama and French (2010) that has been designed to help differentiate between skill and luck for winner mutual funds. Our results indicate that that funds that follow a profitability and investment styles also earn significant excess returns. However, we find that fund flows to factor funds are not larger than for non-factor funds. Our results are robust to the use of data on global equity funds and to the use of the bootstrap method of Fama and French (2010).

JEL Classification: G11, G12, G14

Keywords: factor investing, small cap, value, momentum, low-risk, quality, fund flows

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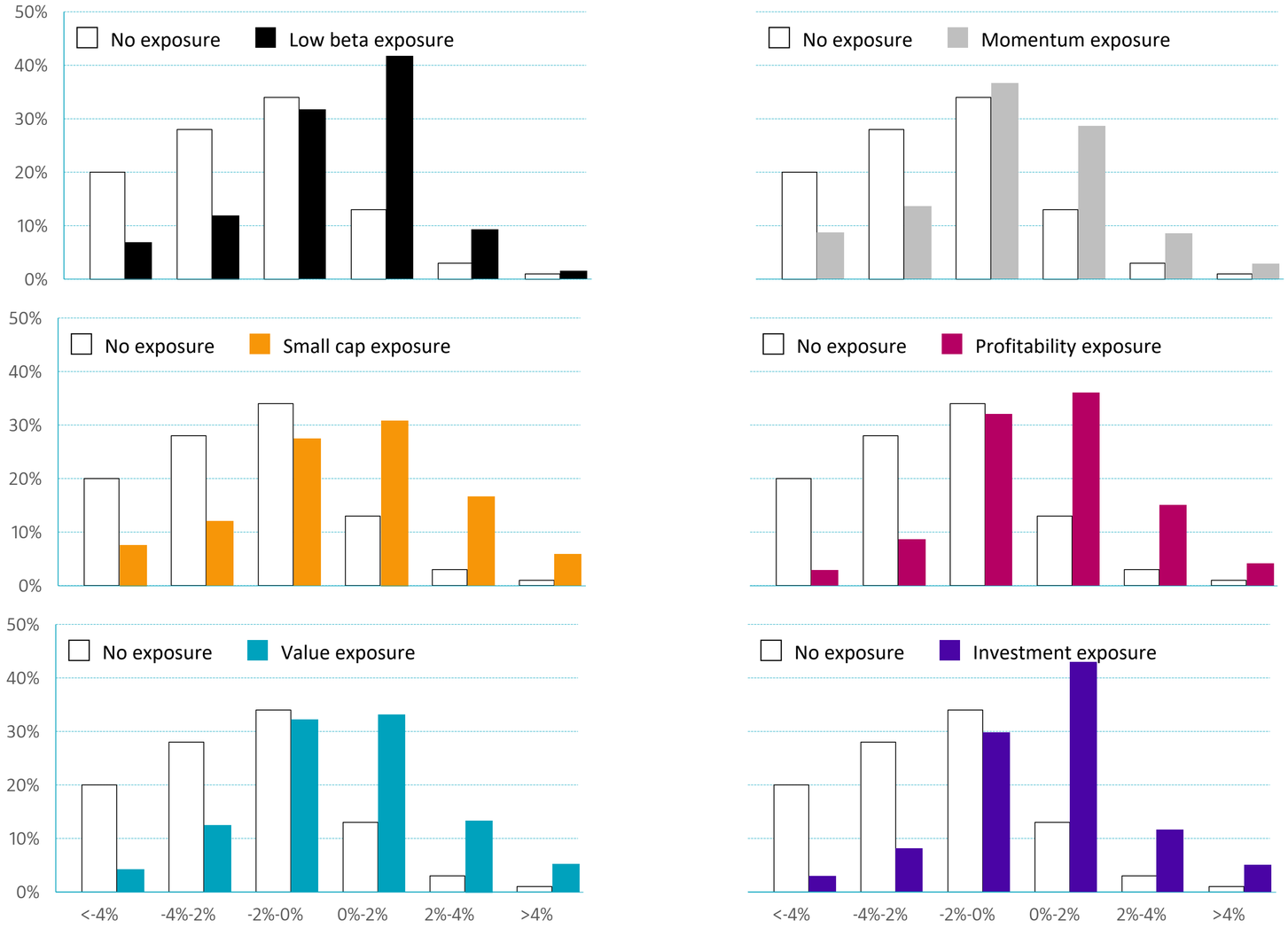

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… BUT THERE IS LARGE DISPERSION BETWEEN FACTOR MANAGERS

Most important determinants of dispersion in factor fund performance

1. Factor selection

2. Efficiently harvesting factors

3. **Efficiently combining factors**
   - > No “one size fits all”
   - > Needs holistic portfolio view

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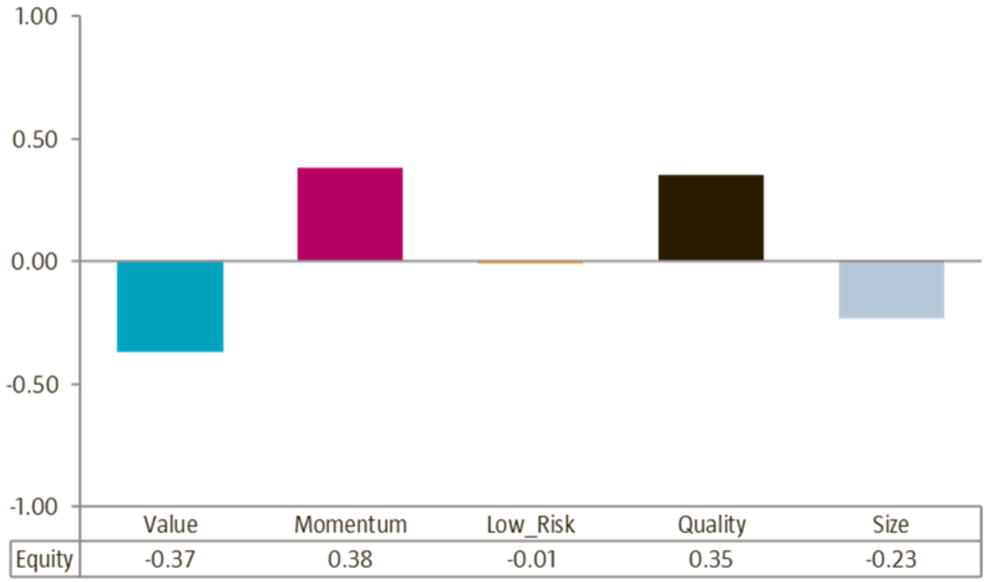
IMPROVEMENTS OF ROBECO FACTOR EXPOSURE MONITOR

FIRST FACTOR SCAN GENERATION

Active Portfolio
Equity only

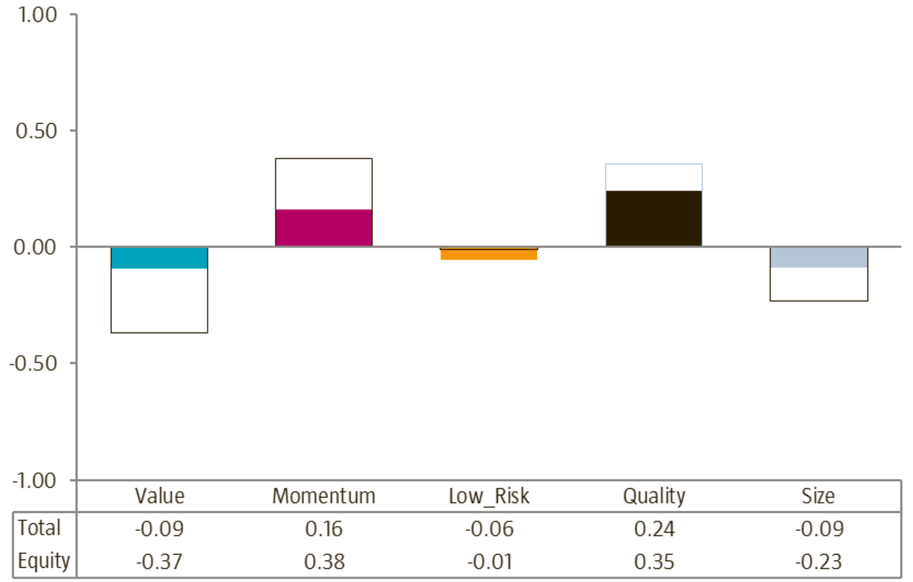
100% Active



	Value	Momentum	Low_Risk	Quality	Size
Equity	-0.37	0.38	-0.01	0.35	-0.23

Total portfolio with factor completion
Equity only

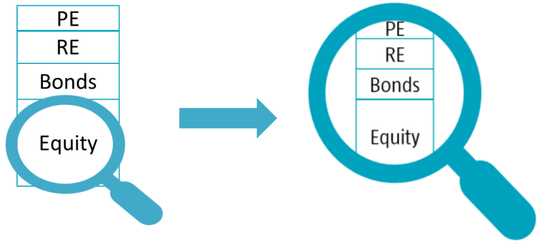
60% Active + 40% MSCI Value-Weighted



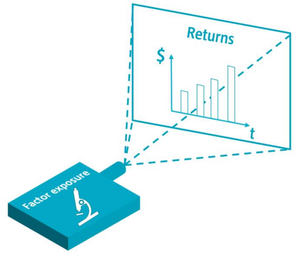
	Value	Momentum	Low_Risk	Quality	Size
Total	-0.09	0.16	-0.06	0.24	-0.09
Equity	-0.37	0.38	-0.01	0.35	-0.23

POTENTIAL IMPROVEMENTS

1. Include alternative asset classes



2. Project returns



3. Visualize output

INCORPORATE ALTERNATIVE ASSETS

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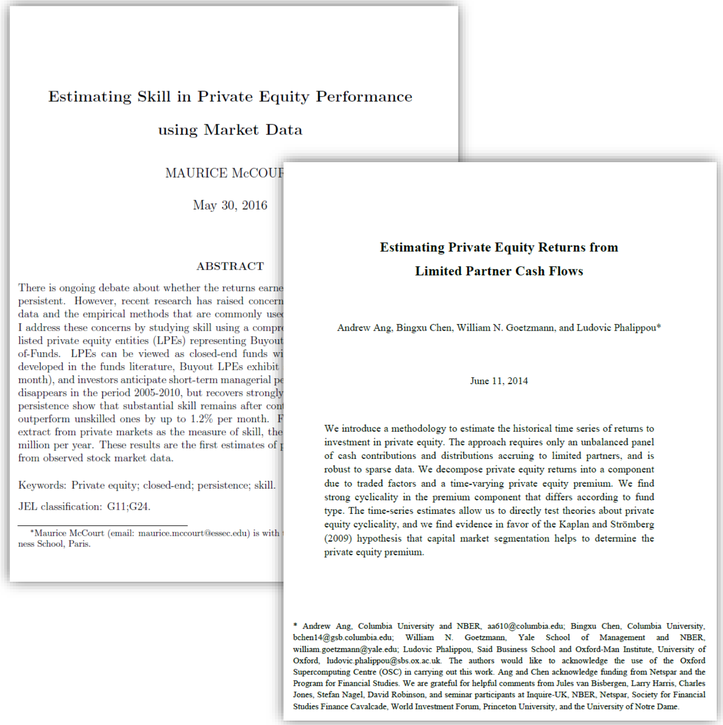
Insight
Factor exposures in Private Equity, Real Estate and Real Assets

Challenge
No holdings data available for alternative assets

Solution
Returns-based style analysis



Estimating Skill in Private Equity Performance using Market Data

MAURICE McCOUR

May 30, 2016

ABSTRACT

There is ongoing debate about whether the returns earne persistent. However, recent research has raised concern data and the empirical methods that are commonly use I address these concerns by studying skill using a compr listed private equity entities (LPEs) representing Buyout of-Funds. LPEs can be viewed as closed-end funds wi developed in the funds literature, Buyout LPEs exhibit month), and investors anticipate short-term managerial pe disappears in the period 2005-2010, but recovers strongly persistence show that substantial skill remains after cont outperform unskilled ones by up to 1.2% per month. F extract from private markets as the measure of skill, the million per year. These results are the first estimates of p from observed stock market data.

Keywords: Private equity; closed-end; persistence; skill.

JEL classification: G11;G24.

*Maurice McCourt (email: maurice.mccourt@essec.edu) is with ness School, Paris.

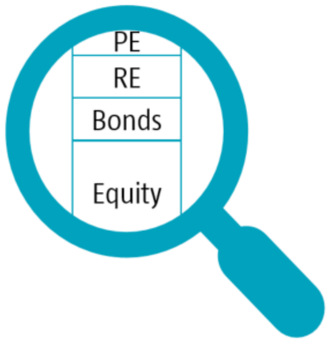
Estimating Private Equity Returns from Limited Partner Cash Flows

Andrew Ang, Bingxu Chen, William N. Goetzmann, and Ludovic Phalippou*

June 11, 2014

We introduce a methodology to estimate the historical time series of returns to investment in private equity. The approach requires only an unbalanced panel of cash contributions and distributions accruing to limited partners, and is robust to sparse data. We decompose private equity returns into a component due to traded factors and a time-varying private equity premium. We find strong cyclicality in the premium component that differs according to fund type. The time-series estimates allow us to directly test theories about private equity cyclicality, and we find evidence in favor of the Kaplan and Strömberg (2009) hypothesis that capital market segmentation helps to determine the private equity premium.

* Andrew Ang, Columbia University and NBER, aa610@columbia.edu; Bingxu Chen, Columbia University, bchen14@gsb.columbia.edu; William N. Goetzmann, Yale School of Management and NBER, william.goetzmann@yale.edu; Ludovic Phalippou, Said Business School and Oxford-Man Institute, University of Oxford, ludovic.phalippou@sbs.ox.ac.uk. The authors would like to acknowledge the use of the Oxford Supercomputing Centre (OSC) in carrying out this work. Ang and Chen acknowledge funding from Netspar and the Program for Financial Studies. We are grateful for helpful comments from Jules van Binsbergen, Larry Harris, Charles Jones, Stefan Nagel, David Robinson, and seminar participants at Inquire-UK, NBER, Netspar, Society for Financial Studies Finance Cavalcade, World Investment Forum, Princeton University, and the University of Notre Dame.

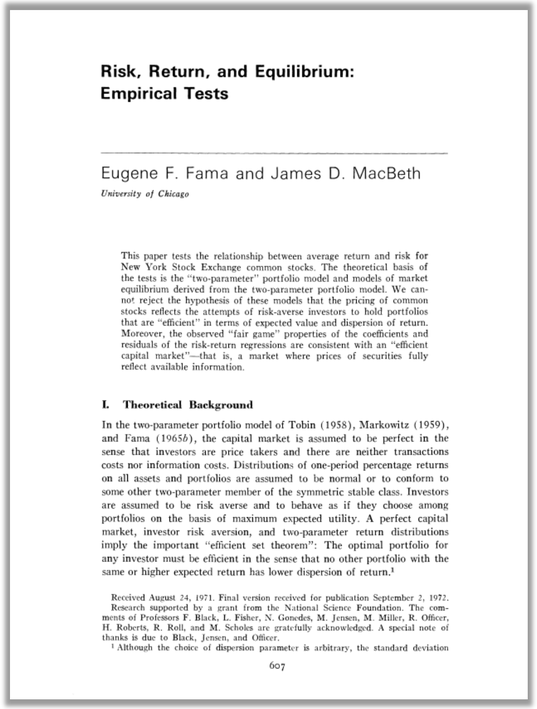


RETURN PROJECTION

Insight
Factor exposures affect performance

Challenge
Difficult to estimate returns

Solution
Fama-MacBeth regressions



Risk, Return, and Equilibrium: Empirical Tests

Eugene F. Fama and James D. MacBeth
University of Chicago

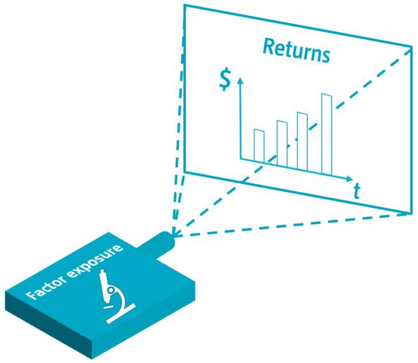
This paper tests the relationship between average return and risk for New York Stock Exchange common stocks. The theoretical basis of the tests is the "two-parameter" portfolio model and models of market equilibrium derived from the two-parameter portfolio model. We cannot reject the hypothesis of these models that the pricing of common stocks reflects the attempts of risk-averse investors to hold portfolios that are "efficient" in terms of expected value and dispersion of return. Moreover, the observed "fair game" properties of the coefficients and residuals of the risk-return regressions are consistent with an "efficient capital market"—that is, a market where prices of securities fully reflect available information.

I. Theoretical Background

In the two-parameter portfolio model of Tobin (1958), Markowitz (1959), and Fama (1965*b*), the capital market is assumed to be perfect in the sense that investors are price takers and there are neither transactions costs nor information costs. Distributions of one-period percentage returns on all assets and portfolios are assumed to be normal or to conform to some other two-parameter member of the symmetric stable class. Investors are assumed to be risk averse and to behave as if they choose among portfolios on the basis of maximum expected utility. A perfect capital market, investor risk aversion, and two-parameter return distributions imply the important "efficient set theorem": The optimal portfolio for any investor must be efficient in the sense that no other portfolio with the same or higher expected return has lower dispersion of return.[1]

Received August 24, 1971. Final version received for publication September 2, 1972. Research supported by a grant from the National Science Foundation. The comments of Professors F. Black, L. Fisher, N. Gonedes, M. Jensen, M. Miller, R. Officer, H. Roberts, R. Roll, and M. Scholes are gratefully acknowledged. A special note of thanks is due to Black, Jensen, and Officer.

[1] Although the choice of dispersion parameter is arbitrary, the standard deviation



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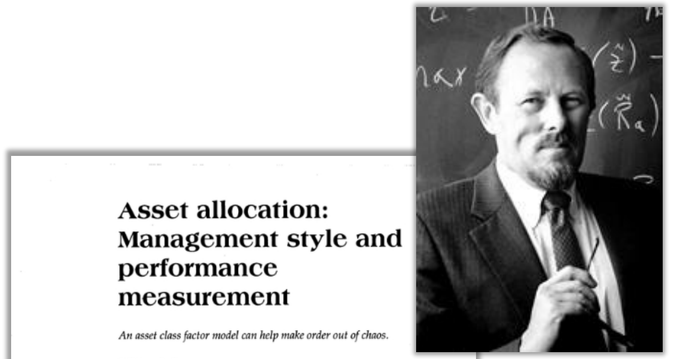
METHODOLOGY 1

Incorporate alternative assets

RETURNS-BASED STYLE ANALYSIS

Origin
Sharpe (1992) "Asset Allocation: Management Style & Performance Measurement"



Asset allocation: Management style and performance measurement

An asset class factor model can help make order out of chaos.

William F. Sharpe

It is widely agreed that asset allocation accounts for a large part of the variability in the return on a typical investor's portfolio. This is especially true if the portfolio is invested in multiple funds, each including a number of securities.

Asset allocation is generally defined as the allocation of an investor's portfolio across a number of "major" asset classes. Clearly such a generalization cannot be made operational without defining such classes.

Once a set of asset classes has been defined, it is important to determine the exposures of each component of an investor's overall portfolio to movements in their returns. Such information can be aggregated to determine the investor's overall effective asset mix. If it does not conform to the desired mix, appropriate alterations can then be made.

Once a procedure for measuring exposure to variations in returns of major asset classes is in place, it is possible to determine how effectively individual fund managers have performed their functions and the extent (if any) to which value has been added through active management. Finally, the effectiveness of the investor's overall asset allocation can be compared with that of one or more benchmark asset mixes.

An effective way to accomplish all these tasks is to use an asset class factor model. After describing the characteristics of such a model, we illustrate application of a model with twelve asset classes to analyze the performance of a set of open-end mutual funds between 1985 and 1989.

Factor models are common in investments analysis. Equation (1) is a generic representation:

$$\tilde{R}_i = [b_{i1}\tilde{F}_1 + b_{i2}\tilde{F}_2 + \ldots + b_{in}\tilde{F}_n] + \tilde{\epsilon}_i \quad (1)$$

$\tilde{R}_i$ represents the return on asset i, $\tilde{F}_1$ represents the [illegible] of factor 1, $\tilde{F}_2$ the value of factor 2, and so on. The value of the nth factor, and the "non-factor" component of the return on i. All these values are (potentially) unknown before-the-fact, as indicated by the tildes. The remaining values (b_{i1} through b_{in}) represent the sensitivities of $\tilde{R}_i$ to factors $\tilde{F}_1$ through $\tilde{F}_n$.

A key assumption makes a model of this sort more than simply an exercise in data description: The non-factor return for one asset (e.g., $\tilde{\epsilon}_i$) is assumed to be uncorrelated with that of every other (e.g., $\tilde{\epsilon}_j$). In effect, the factors are the only sources of correlation among returns.

An asset class factor model can be considered a special case of the generic type. In such a model each factor represents the return on an asset class, and the sensitivities (b_{ij} values) are required to sum to 1

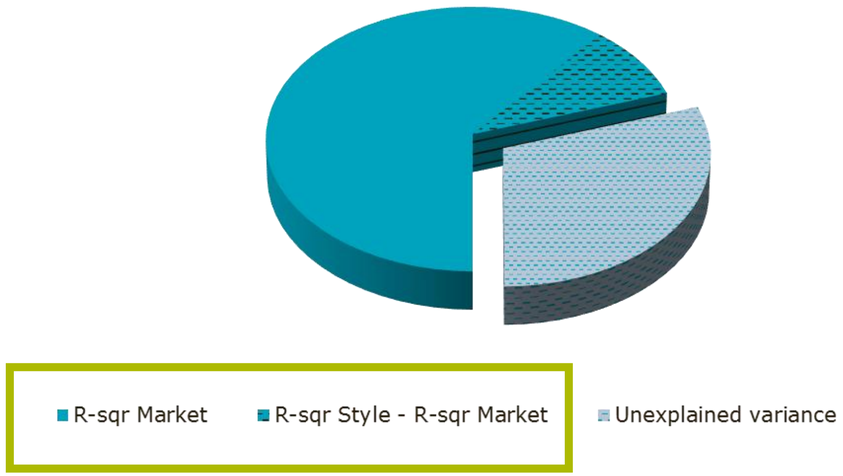
WILLIAM F. SHARPE is Timken Professor Emeritus of Finance, Stanford University Graduate School of Business, and Chairman of William F. Sharpe Associates in Los Altos (CA 94022). This article is adapted from the O'Neil Abbott Distinguished Lecture given at the Darden School of the University of Virginia on October 2, 1990. The author thanks Robert O'Neil, Mark Eaker, and the faculty of the Darden School for making the presentation possible. He also thanks Mark Friebel, Sharon Kitajima, Diana Lieberman, Anita Nanda, and Kathryn Sharpe, colleagues at William F. Sharpe Associates, for their contributions.

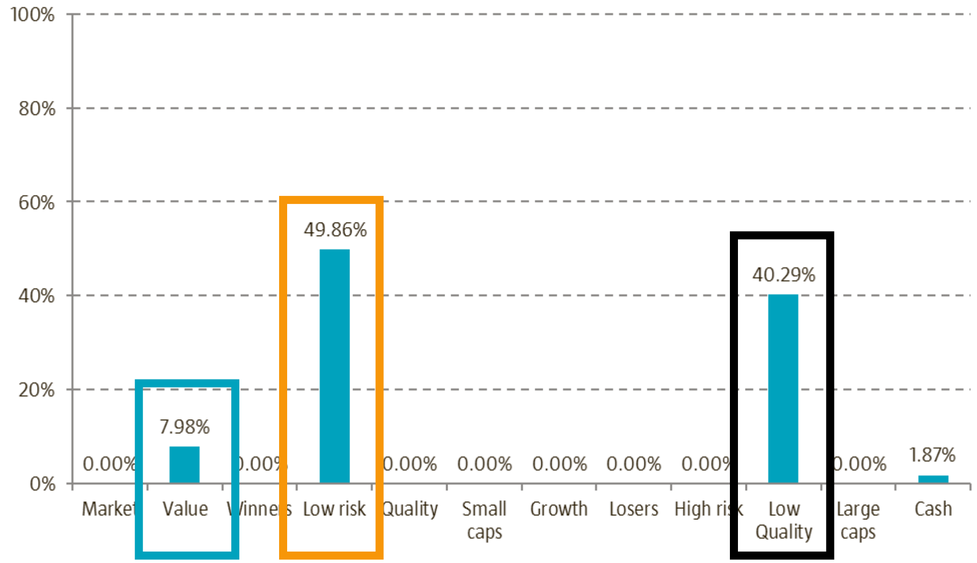
Solution
No holdings data required

Methodology
Attribute performance to set of factors

$$R_i = [b_{i,1}\,F_1 + b_{i,2}\,F_2 \ldots + b_{i,n}\,F_n] + \varepsilon_i$$

RETURNS-BASED STYLE ANALYSIS





$$R_{i,t} = [b_{i,1} F_{1,t} + b_{i,2} F_{2,t} \ldots + b_{i,n} F_{n,t}] + \varepsilon_t$$

70% of Real Estate returns + 50% Value + 50% Low risk + 40% Quality

EXAMPLE: REAL ESTATE EXPOSURES

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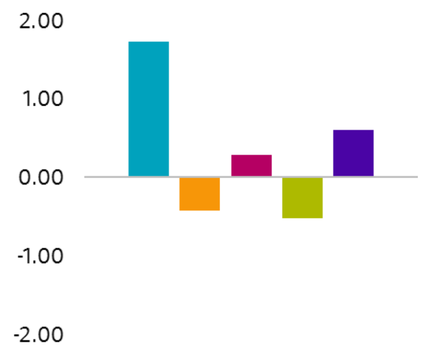
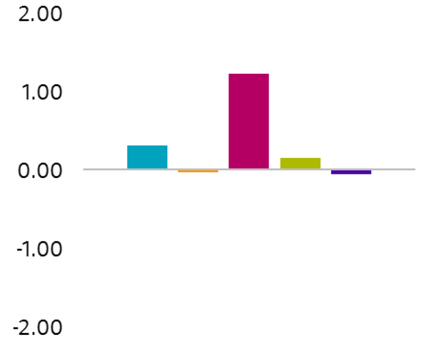
70% of Real Estate Returns

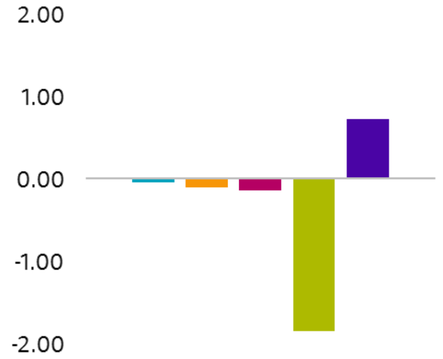
8% Value

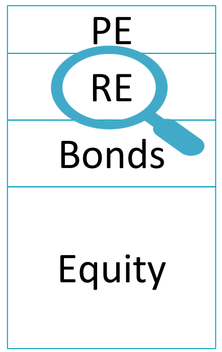


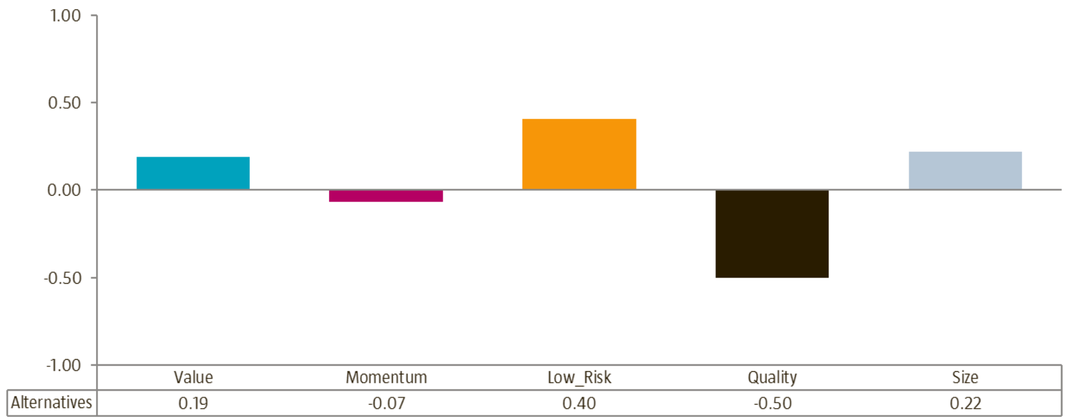
50% Low risk



40% Low Quality







	Value	Momentum	Low_Risk	Quality	Size
Alternatives	0.19	-0.07	0.40	-0.50	0.22

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METHODOLOGY 2

Return projection

REGRESSION ANALYSIS

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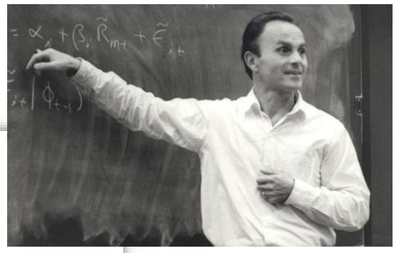
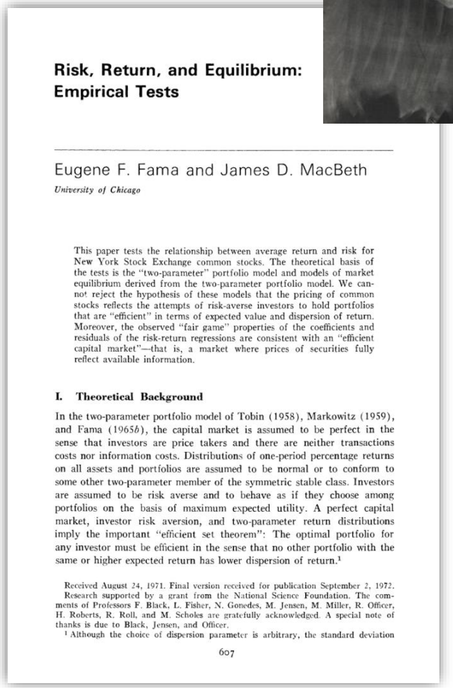
Origin

Fama MacBeth (1973) “Risk, Return and Equilibrium: Empirical Tests”





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[1] Although the choice of dispersion parameter is arbitrary, the standard deviation

Solution

Estimate time series of factor premium returns

Methodology

$$R_{i,t} = \alpha_i + v \cdot VAL_{i,t} \cdot + m \cdot MOM_{i,t} + l \cdot Low\ Risk_{i,t} + q \cdot QUAL_{i,t} + s \cdot SIZE_{i,t} + \varepsilon_{i,t}$$

REGRESSION ANALYSIS

$$R_{i,t} = \alpha_i + v \cdot VAL_{i,t} \cdot + m \cdot MOM_{i,t} + l \cdot Low\ Risk_{i,t} + q \cdot QUAL_{i,t} + s \cdot SIZE_{i,t} + \varepsilon_{i,t}$$

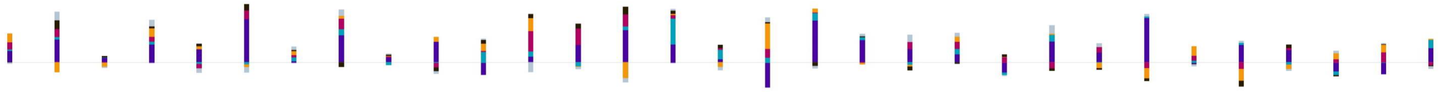
Stock return		=	Value	+	Momentum	+	Low risk	+	Quality	+	Size
AAR CORP.	0.02%		0.12		0.11		-0.86		0.29		2.27
Aflac Incorporated	0.30%		-0.46		2.60		-1.86		-0.16		2.05
AMR Corporation	0.13%		0.80		-0.25		-2.01		-0.31		1.51
AT&T Corp.	-0.14%		-0.57		-0.90		0.01		0.62		-3.00
Abbott Laboratories	0.01%		-1.08		1.29		-0.16		1.64		-0.45
AbitibiBowater Inc.	0.05%		v * 0.24		m * -0.27		l * 0.49		q * -0.29		s * 2.09
Aerojet Rocketdyne Holdings, Inc.	0.03%		-0.23		1.42		-0.62		-0.36		1.82
Advanced Micro Devices, Inc.	-0.06%		-0.93		-1.70		-1.83		0.46		1.78
Aetna Inc.	0.06%		0.07		1.13		0.58		-1.26		0.34
H.F. Ahmanson & Company	0.17%		0.63		2.38		-1.51		-0.53		1.87
Albertsons Inc.	-0.01%		-0.20		-0.87		0.15		2.51		1.96
Alcoa Corp.	0.09%		0.24		-0.64		-0.49		0.16		1.27
.....	...		...		...		...		...		...

Regression and factor score calculations on a monthly basis.

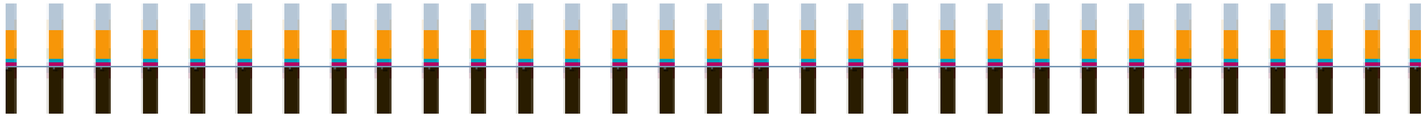
PROJECT RETURNS FROM EXPOSURES

$$R_{i,t} = \alpha_i + v \cdot VAL_{i,t} \cdot + m \cdot MOM_{i,t} + l \cdot Low\ Risk_{i,t} + q \cdot QUAL_{i,t} + s \cdot SIZE_{i,t} + \varepsilon_{i,t}$$

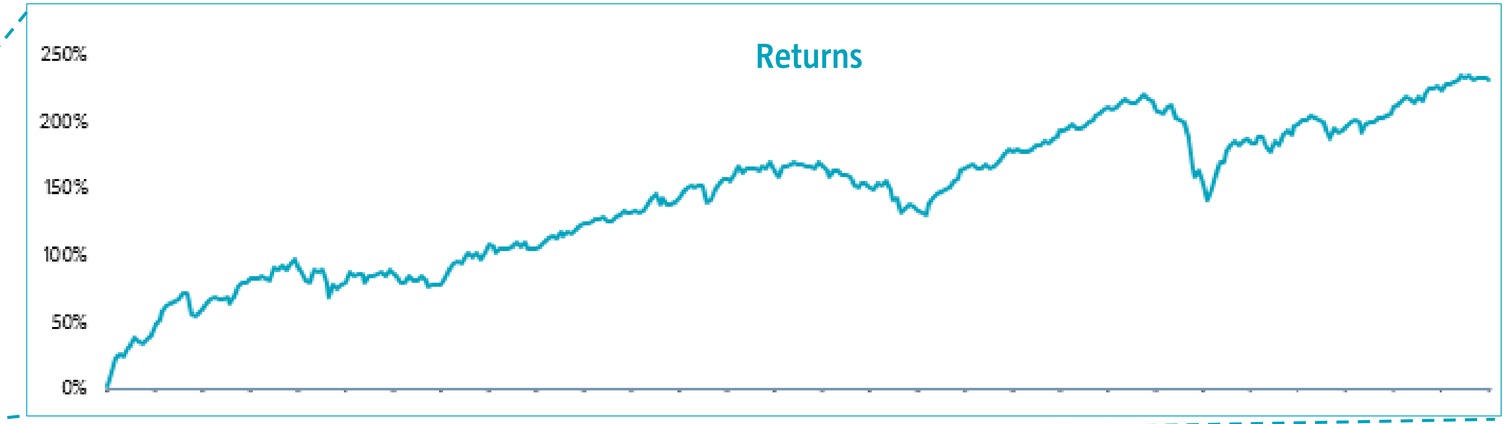
Step 1
Calculate coefficients



Step 2
Apply factor exposures



Step 3
Project returns



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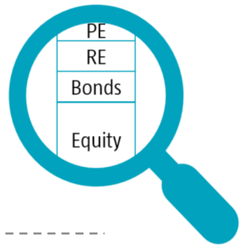
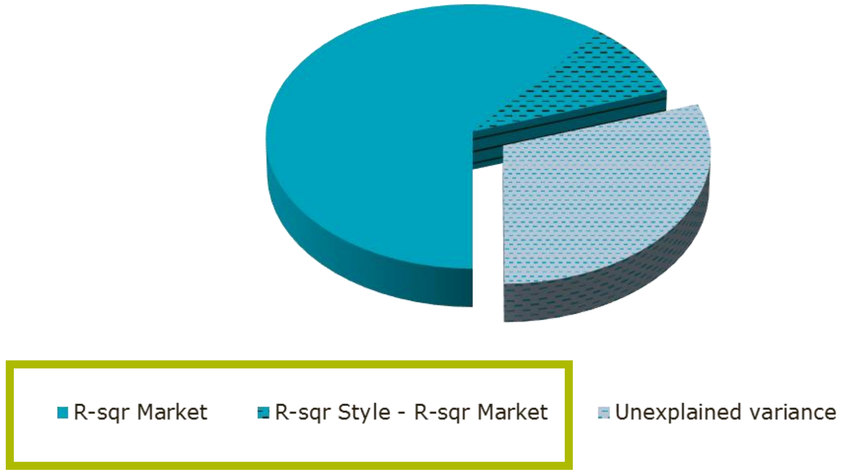
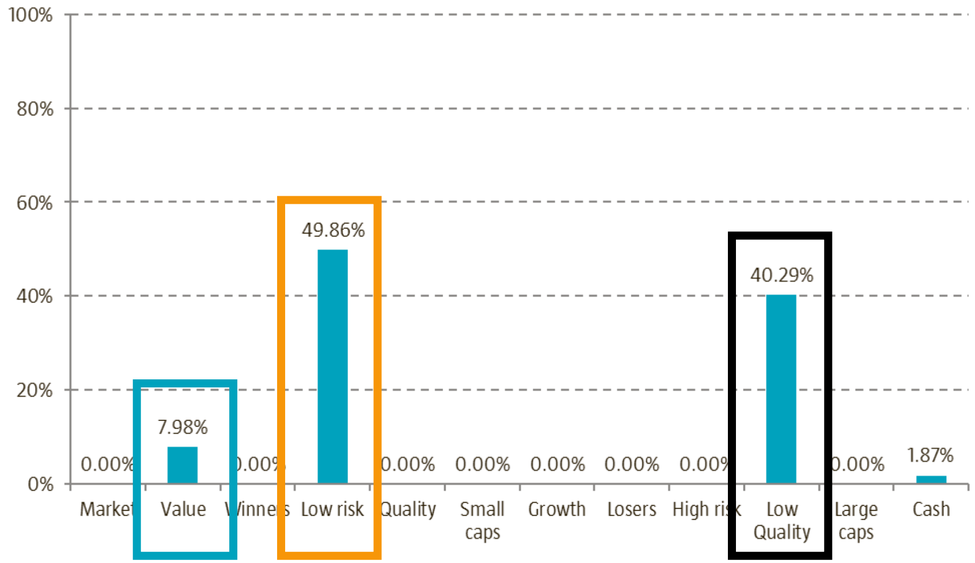
CASE 1

Real Estate

RETURNS-BASED STYLE ANALYSIS







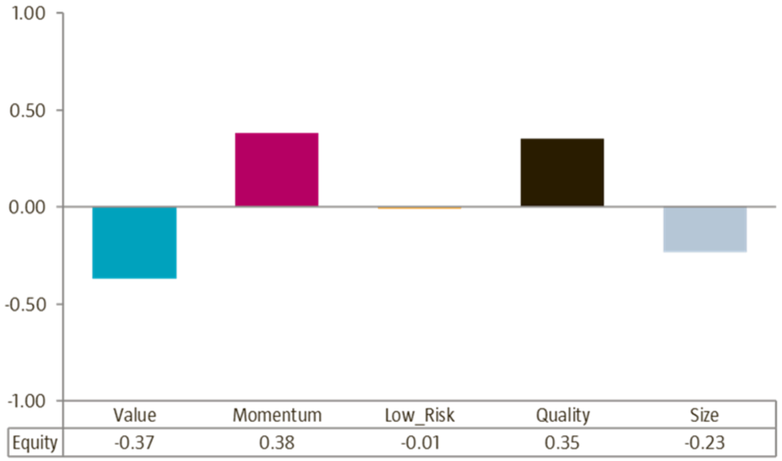
70% of Real Estate returns = 8% Value + 50% Low risk + 40% Quality

Incorporate Real Estate in portfolio scans for total portfolio perspective

TOTAL PORTFOLIO PERSPECTIVE

Active Portfolio
Equity only

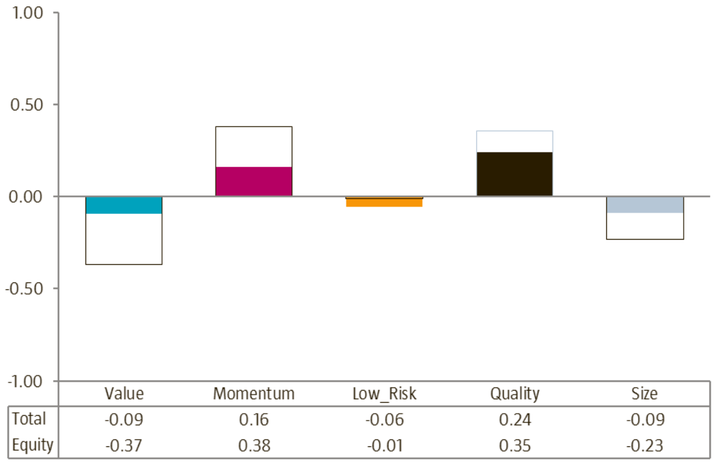
100% Active



	Value	Momentum	Low_Risk	Quality	Size
Equity	-0.37	0.38	-0.01	0.35	-0.23

Total portfolio with factor completion
Equity only

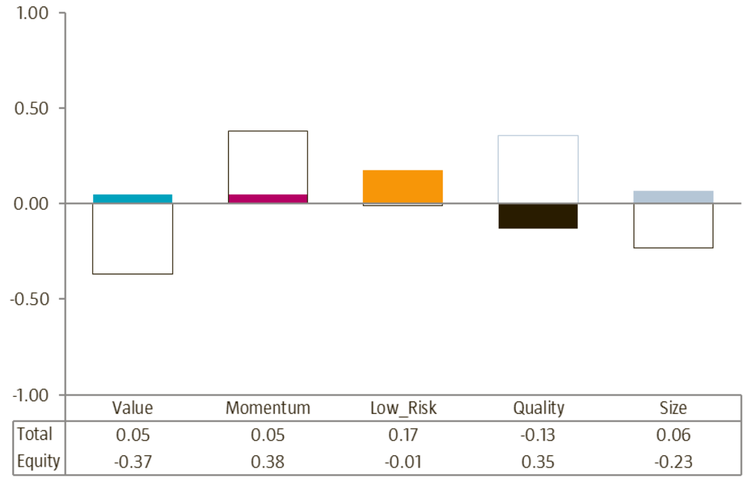
60% Active + 40% MSCI Value-Weighted



	Value	Momentum	Low_Risk	Quality	Size
Total	-0.09	0.16	-0.06	0.24	-0.09
Equity	-0.37	0.38	-0.01	0.35	-0.23

Total portfolio with factor completion
Equity + Real Estate

30% Active + 20% MSCI Value-Weighted + 50% Real Estate



	Value	Momentum	Low_Risk	Quality	Size
Total	0.05	0.05	0.17	-0.13	0.06
Equity	-0.37	0.38	-0.01	0.35	-0.23

HOW WILL MY PORTFOLIO PERFORM?

ROBECO

ACTIVE PORTFOLIO

VALUE

MOMENTUM

LOW RISK

QUALITY

SMALL CAP

GROWTH

LOSERS

HIGH RISK

LOW QUALITY

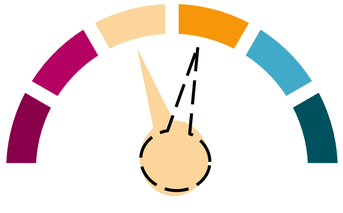
LARGE CAP

HOW WILL MY PORTFOLIO PERFORM?

COMPLETION PORTFOLIO WITH MSCI VALUE

VALUE

MOMENTUM



LOW RISK

QUALITY

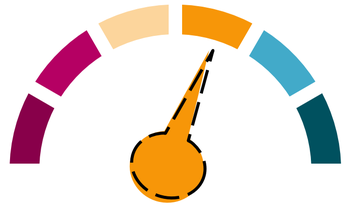
SMALL CAP

GROWTH

LOSERS

HIGH RISK

LOW QUALITY



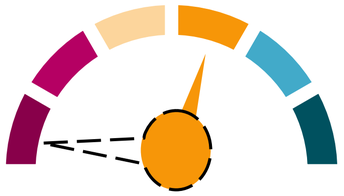
LARGE CAP

LOW HIGH

HOW WILL MY PORTFOLIO PERFORM?

ROBECO

COMPLETION PORTFOLIO WITH MSCI VALUE AND REAL ESTATE



VALUE

MOMENTUM

LOW RISK

QUALITY

SMALL CAP

GROWTH

LOSERS

HIGH RISK

LOW QUALITY

LARGE CAP

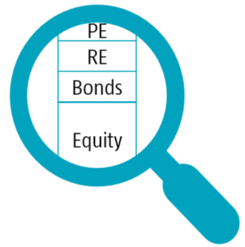
ROBECO

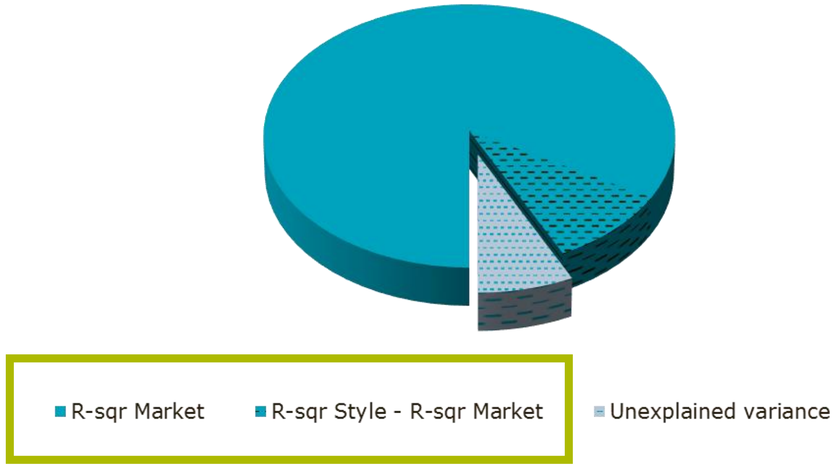
CASE 2

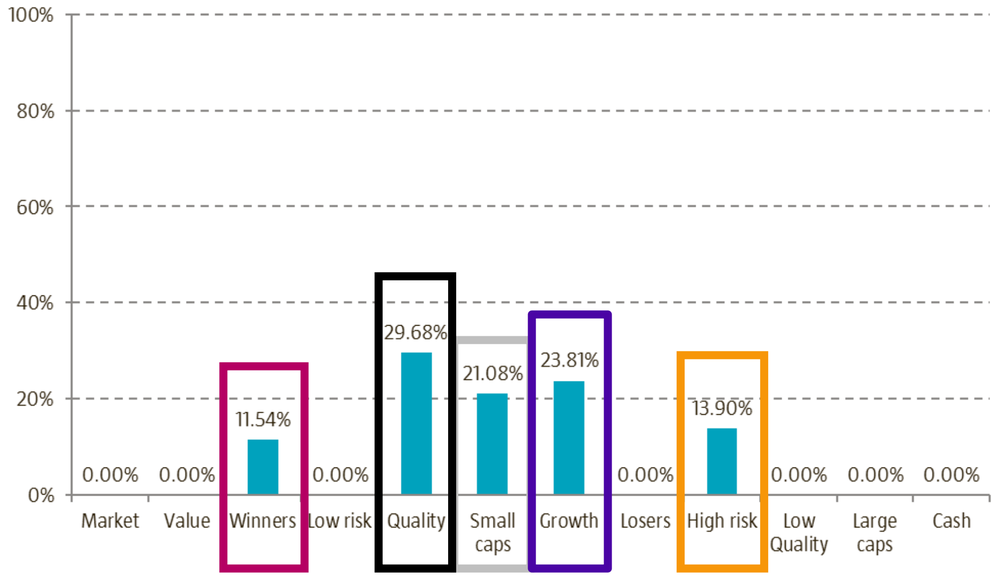
Private Equity

RETURNS-BASED STYLE ANALYSIS

ROBECO







90% of Private Equity returns = 11% Momentum + 30% Quality + 21% Size + 24% Growth + 14% High risk

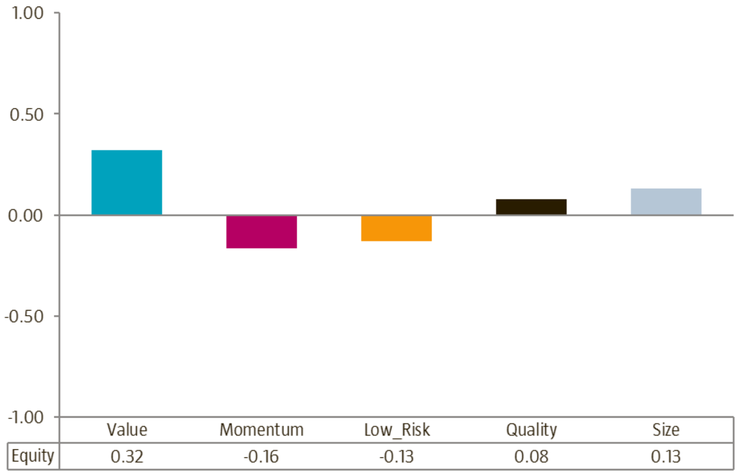
Incorporate Private Equity in portfolio scans for total portfolio perspective

TOTAL PORTFOLIO PERSPECTIVE

ROBECO

Active Portfolio
Equity only

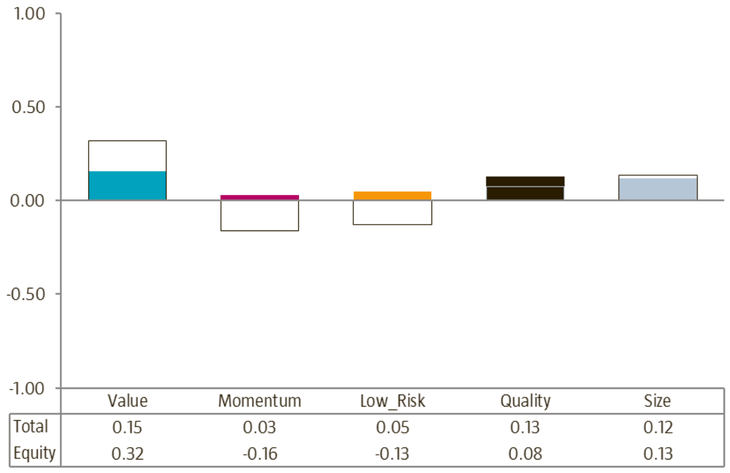
100% Active



	Value	Momentum	Low_Risk	Quality	Size
Equity	0.32	-0.16	-0.13	0.08	0.13

Total portfolio with factor completion
Equity only

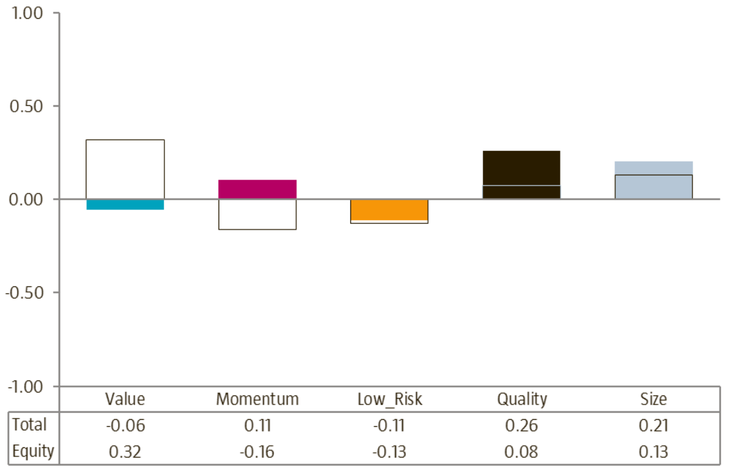
60% Active + 40% MSCI Value-Weighted



	Value	Momentum	Low_Risk	Quality	Size
Total	0.15	0.03	0.05	0.13	0.12
Equity	0.32	-0.16	-0.13	0.08	0.13

Total portfolio with factor completion
Equity + Private Equity

30% Active + 10% MSCI Momentum + 10% MSCI MinVol + 50% Private Equity



	Value	Momentum	Low_Risk	Quality	Size
Total	-0.06	0.11	-0.11	0.26	0.21
Equity	0.32	-0.16	-0.13	0.08	0.13

HOW WILL MY PORTFOLIO PERFORM?

ROBECO

ACTIVE PORTFOLIO

VALUE

MOMENTUM

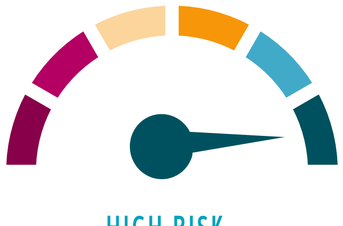
LOW RISK

QUALITY

SMALL CAP

GROWTH

LOSERS



HIGH RISK

LOW QUALITY

LARGE CAP

LOW

HIGH

HOW WILL MY PORTFOLIO PERFORM?

ROBECO

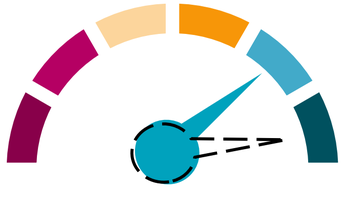
COMPLETE PORTFOLIO WITH MSCI MOMENTUM & MSCI MINVOL

VALUE

MOMENTUM

LOW RISK

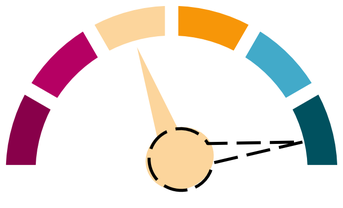
QUALITY



SMALL CAP

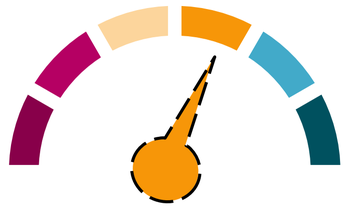
GROWTH

LOSERS



HIGH RISK

LOW QUALITY



LARGE CAP

LOW

HIGH

HOW WILL MY PORTFOLIO PERFORM?

ROBECO

COMPLETION PORTFOLIO WITH MSCI MOMENTUM & MSCI MINVOL AND PRIVATE EQUITY

VALUE

MOMENTUM

LOW RISK

QUALITY

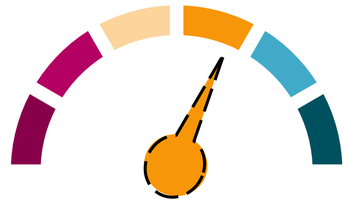
SMALL CAP

GROWTH

LOSERS

HIGH RISK

LOW QUALITY



LARGE CAP

CONCLUDING REMARKS

MAIN TAKE-AWAYS

(In-)efficient combinations of factors lead to performance dispersion

Evaluate factor exposure holistically at overall portfolio level

Expected returns provide useful insight beyond exposure information

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