

MSCI ANNUAL CONFERENCE ON **GLOBAL INVESTING AND RISK MANAGEMENT** WORKSHOP

May 17, 2017

One America Square

London, UK



CONSTRUCTING AND ANALYSING MULTI-ASSET CLASS PORTFOLIOS



Yana Vardarska, *Vice President*, MSCI



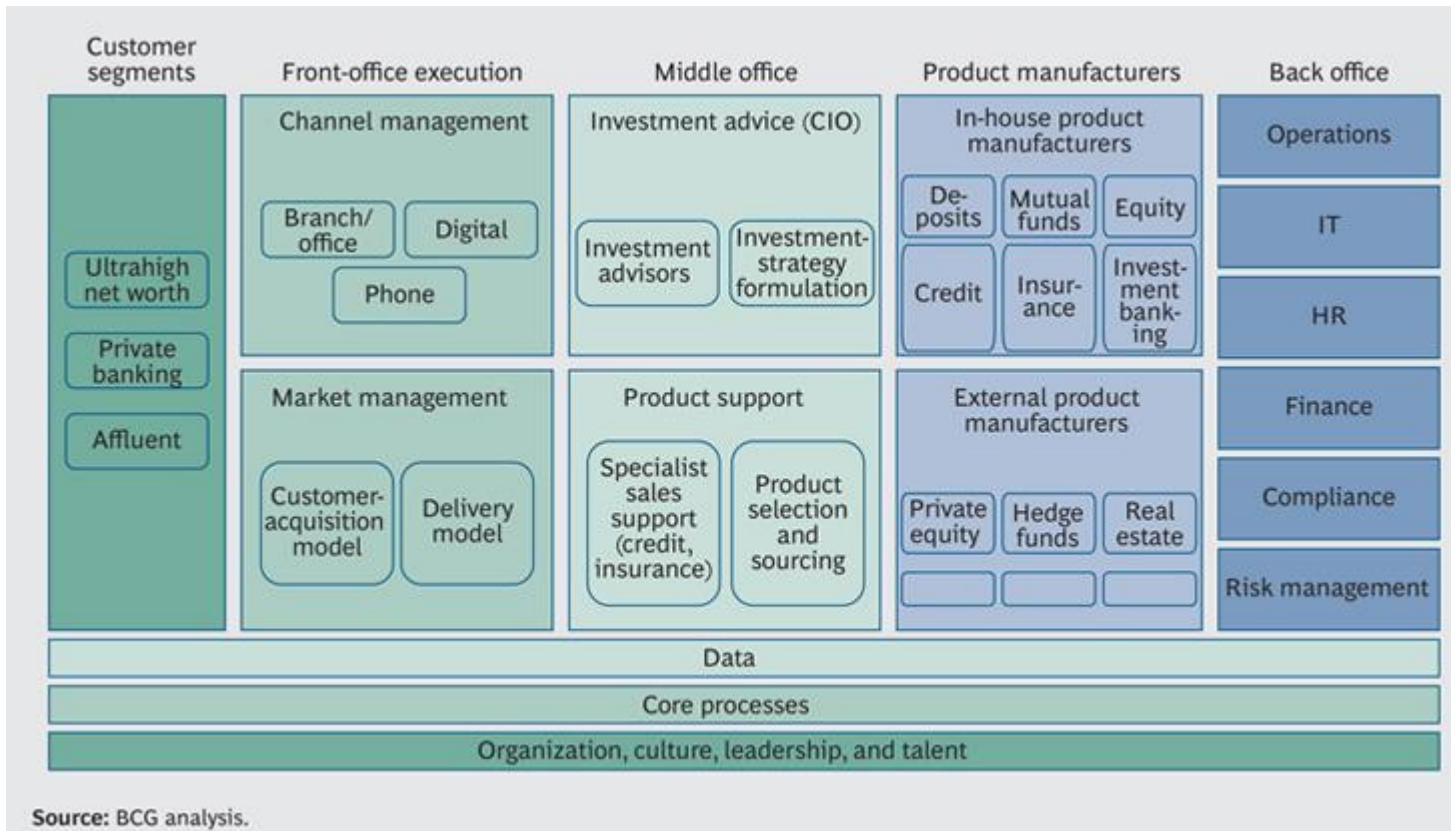
Sam Rubandhas, *Executive Director*, MSCI

#MSCIconf

AGENDA

- Overview of the wealth management Investment problem
- Analytic framework for portfolio construction
- Quantitative Portfolio construction workflow
 - Creating Discretionary portfolios
 - Measure drift of discretionary portfolios from benchmarks & model portfolios
 - Impact of market scenarios
 - Understand the drivers of Risk and Return
 - Create Advisory portfolios (FX Hedging and Alternative investing)
 - Understand the drivers of Risk and Return
- Communicate investment outcomes and decisions with forward looking views of the market

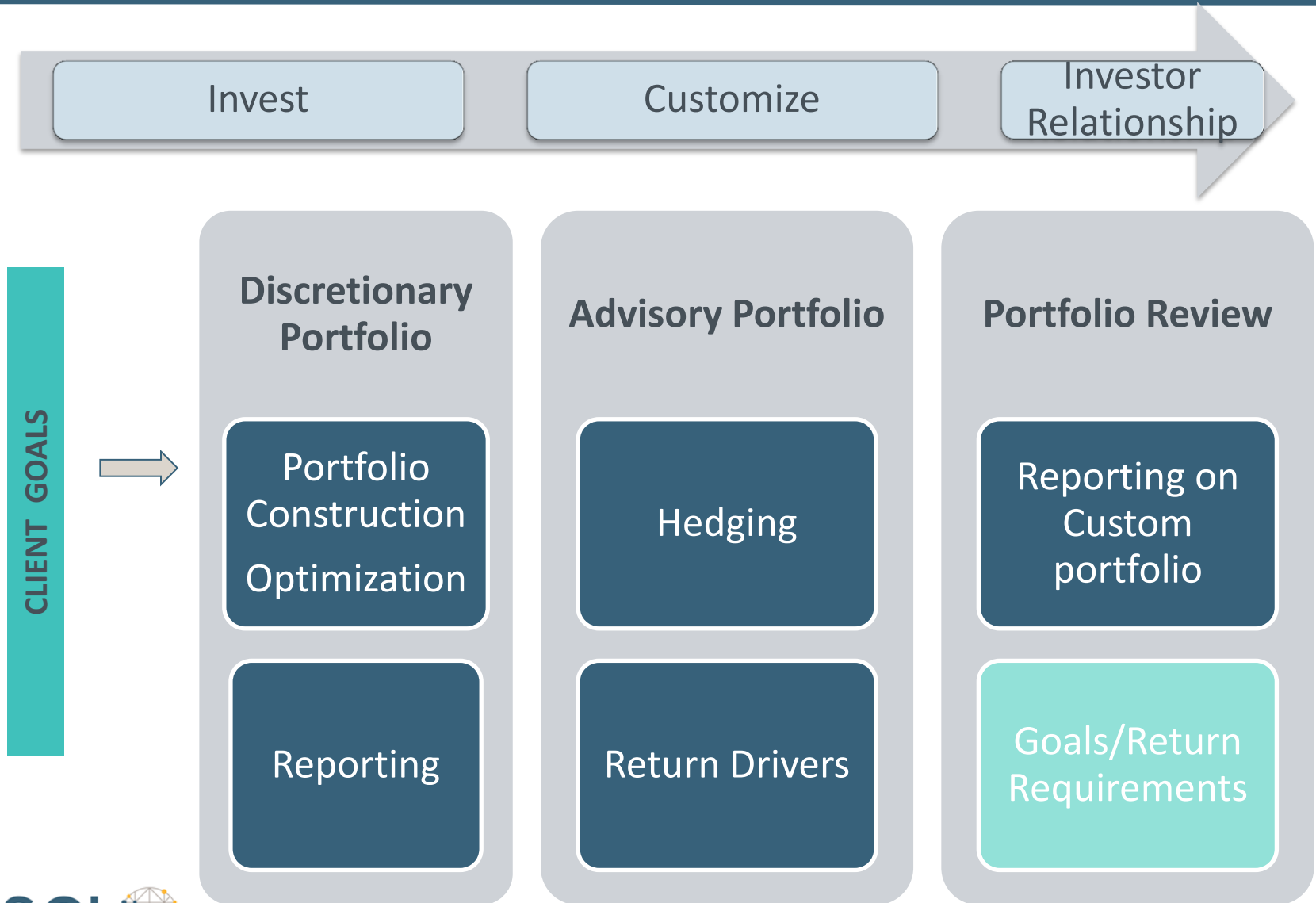
WEALTH MANAGEMENT SUPPLY CHAIN



In a complex supply chain, we focus on the following aspects:

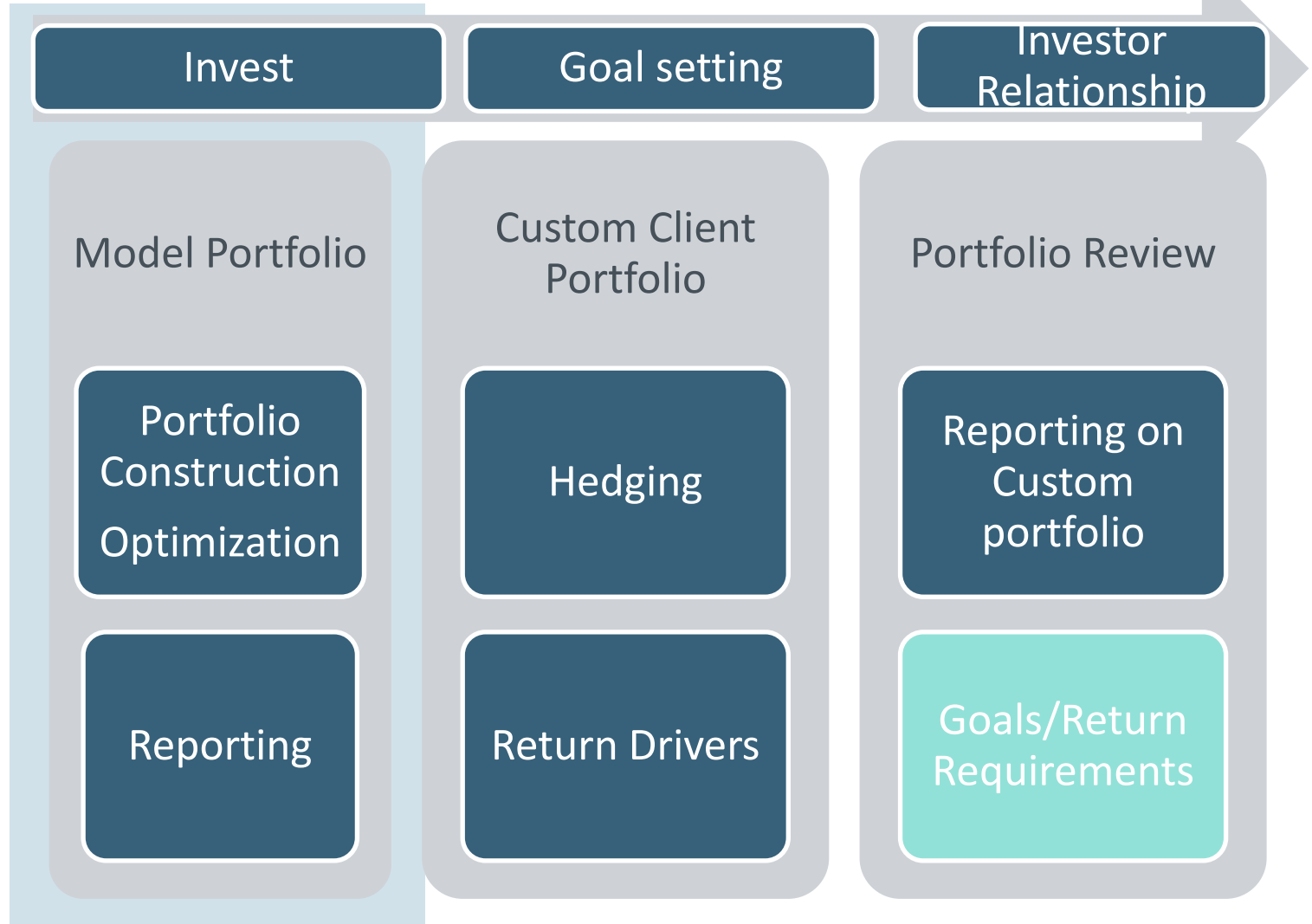
- Strategy Formulation
- Product selection
- Risk Management

WEALTH MANAGEMENT INVESTMENT MODEL



CONSTRUCT & EVALUATE MODEL PORTFOLIOS

WEALTH MANAGEMENT INVESTMENT



INVESTOR PERSONA: EUROPEAN WEALTH MANAGER

Type of Institution

- Long only wealth manager

Benchmark and peer group analysis

- Benchmark invests across the same asset classes , modelled with MSCI and 3rd party indices

Investment Principles/Guidelines

- Focus on multi-asset strategies
- Minimal active risk
- Avoid excessive issuer concentration

Investment Perspective-

- Do not take large bets on EM issuers, CTAs and hedge Funds
- Stay simple. Maintain reduced exposure to optionality (e.g. callables, step-ups, fixed-to-float).

INVESTOR STRATEGY

Use Case: Construct Multi-asset Class Model Portfolios

Investment Insights

- Political uncertainty (Brexit, US Elections)
- Policy uncertainty (Rate hikes, Populism, Protectionsim)
- Geopolitical uncertainty
- Exchange rate volatility

Strategy Overview

- Construct Global multi-asset class portfolios using ETFs and Mutual Funds
- Implemented via risk minimization framework

MSCI Tools Utilized

- Multi-asset class Risk model
- Performance Attribution
- Portfolio Optimizer
- Historical Stress Testing
- Macroeconomic Stress testing

STEPS IN PORTFOLIO CONSTRUCTION

- What asset classes should you include?
 - Equity, Fixed Income, Cash, Real Estate and FX derivatives
- How to represent the asset classes?
 - Mutual funds & ETFs
- How to select the Mutual funds and ETFs?
- How to generate detailed Exposures for Mutual funds and ETFs?
- How to make risk-return trade-offs?
- How to define Risk-levels?

CREATING AN ASSET UNIVERSE

What is my Investable Universe?

Screen universe of more than 270000 natively covered mutual funds and 1400 equity ETFs

Filter the mutual funds by regional focus and investment style

Within each investment style group remove highly correlated pairs

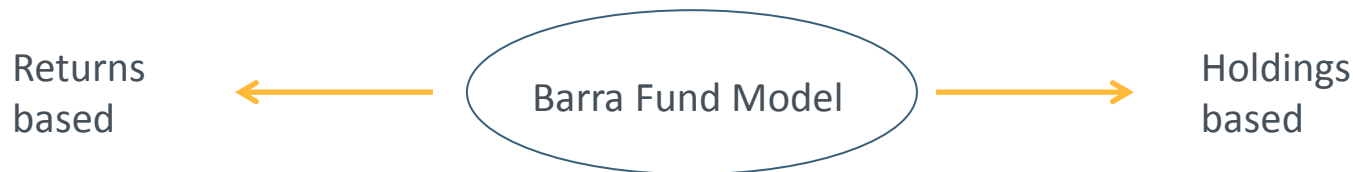
Final universe of 45 funds and ETFs

Next Step: Use the universe to create portfolios with different risk profiles

MODEL PORTFOLIO EX ANTE RISK

How do I model the active risk exposures of mutual funds without transparency about the underlying holdings?

- **The Barra Fund Model** : enhancing traditional returns-based style analysis



- Users can incorporate all information available with confidence level (e.g. sector, style, asset allocation)

Next Step: construct model portfolios by minimizing active risk



USING OPTIMIZATION TECHNIQUES TO CONSTRUCT MODEL PORTFOLIOS WITH DIFFERENT RISK PROFILES

How do I determine the risk - return tradeoff of my multi asset class model portfolios?

- **BarraOne Optimizer** is developed in-house resulting from over two decades of dedicated research
- Takes advantage of the special structure of **multi-factor risk** models employed by many portfolio managers
- Incorporates proprietary solvers with innovative, high-quality heuristic techniques to certain ill-behaved, complex portfolio optimization problems

Next Step: Construct model portfolios with different risk profiles

DISCRETIONARY MODEL PORTFOLIOS

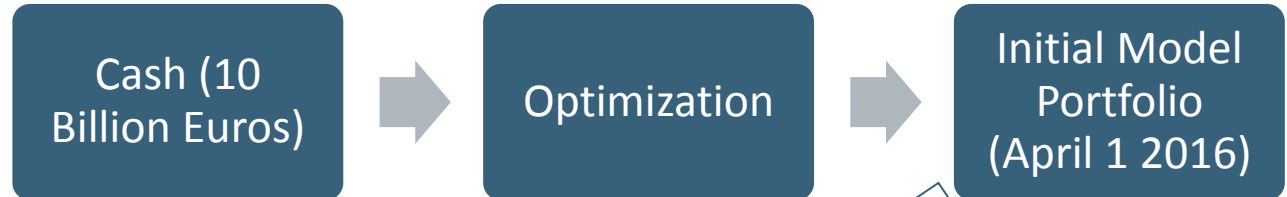
Asset Class	Risk Profile		
	Low Risk	Medium Risk	High Risk
Equity	25%	40 %	60%
Fixed Income	60% 	45%	25% 
Liquidity/Cash and Cash Equivalents	15%		

- Domestic Equity limited to 40% of equity investment
- Corporate Investment Grade to 50% of Fixed Income investment

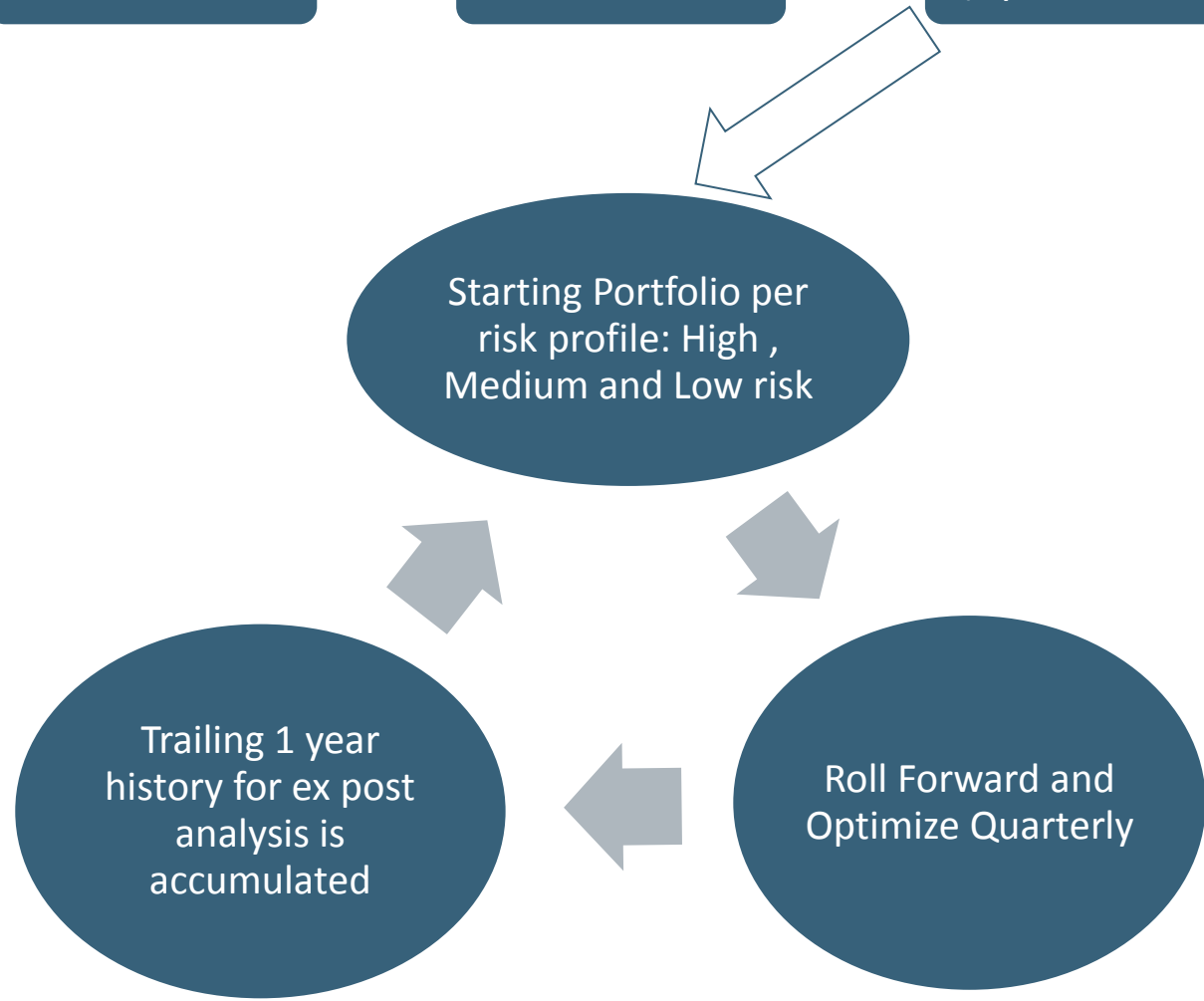
Next Step: execute the allocation strategy over the period: April 2016 through March 2017

PORTFOLIO CONSTRUCTION WORKFLOW

Initial Implementation

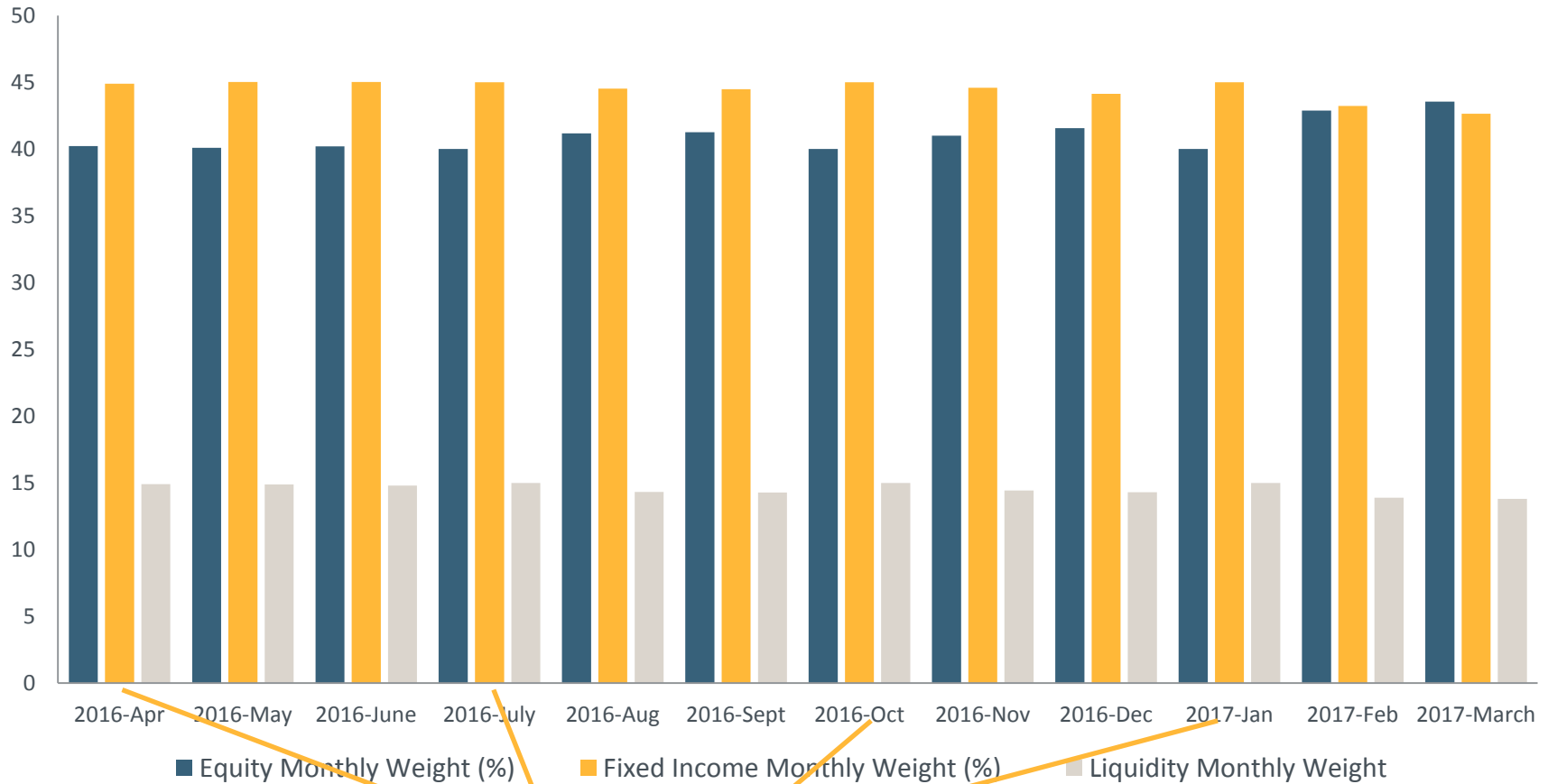


Rebalance Process



PORTFOLIO CONSTRUCTION : OVERVIEW

How stable are my allocations?

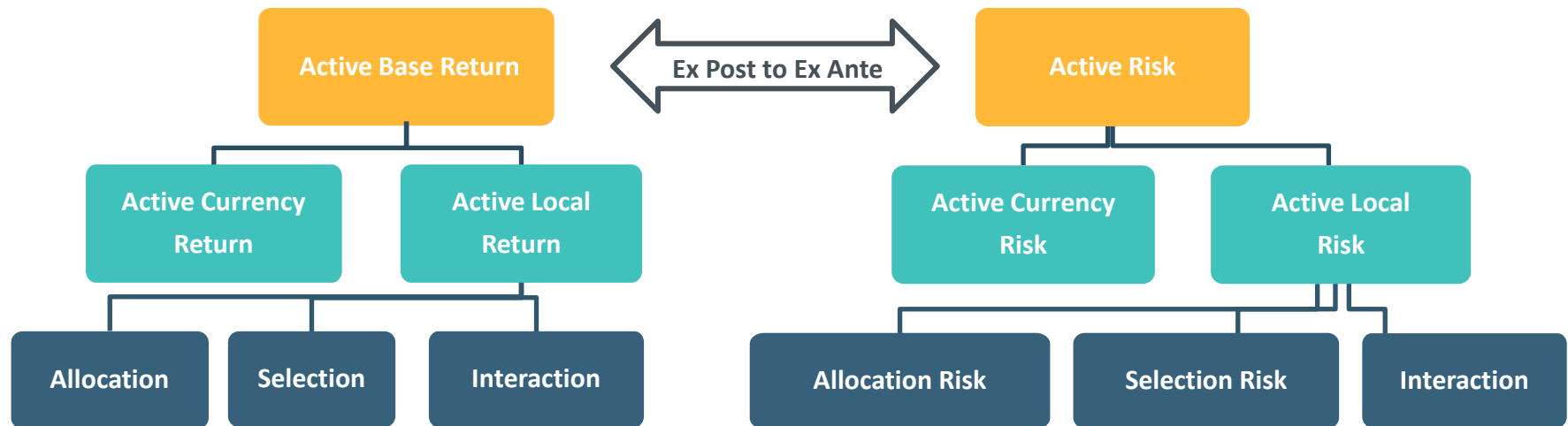


RISK AND RETURN ANALYSIS

ANALYZE AND EVALUATE THE PERFORMANCE OF THE MODEL PORTFOLIOS

Can I align the sources of risk with drivers of portfolio return?

INTEGRATED RISK AND PERFORMANCE ANALYSIS ACROSS ASSETS



Next Step: compare ex ante active risk with asset allocation strategy

RISK ATTRIBUTION ALIGNED WITH ASSET ALLOCATION

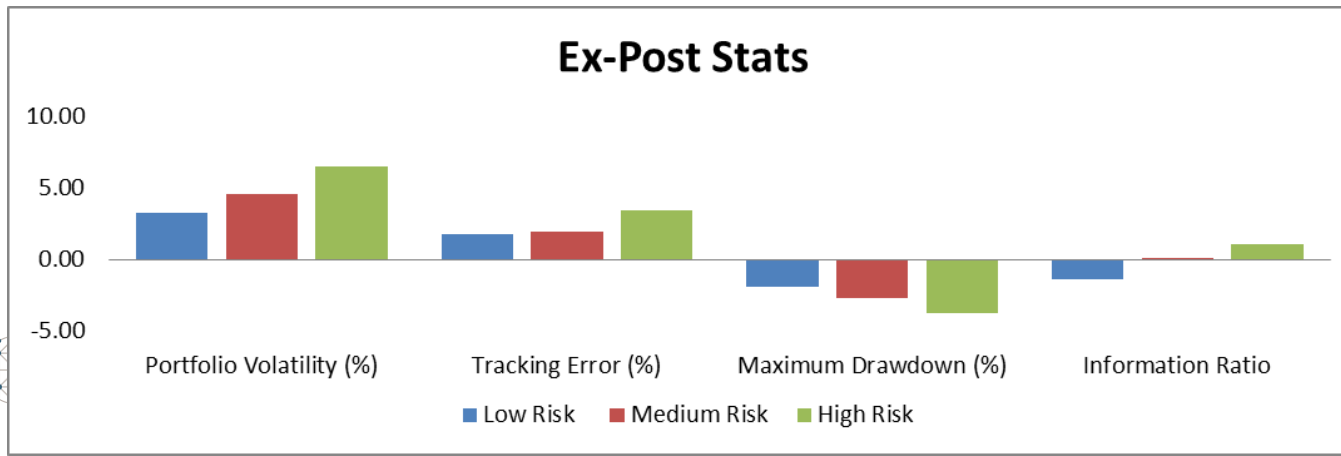
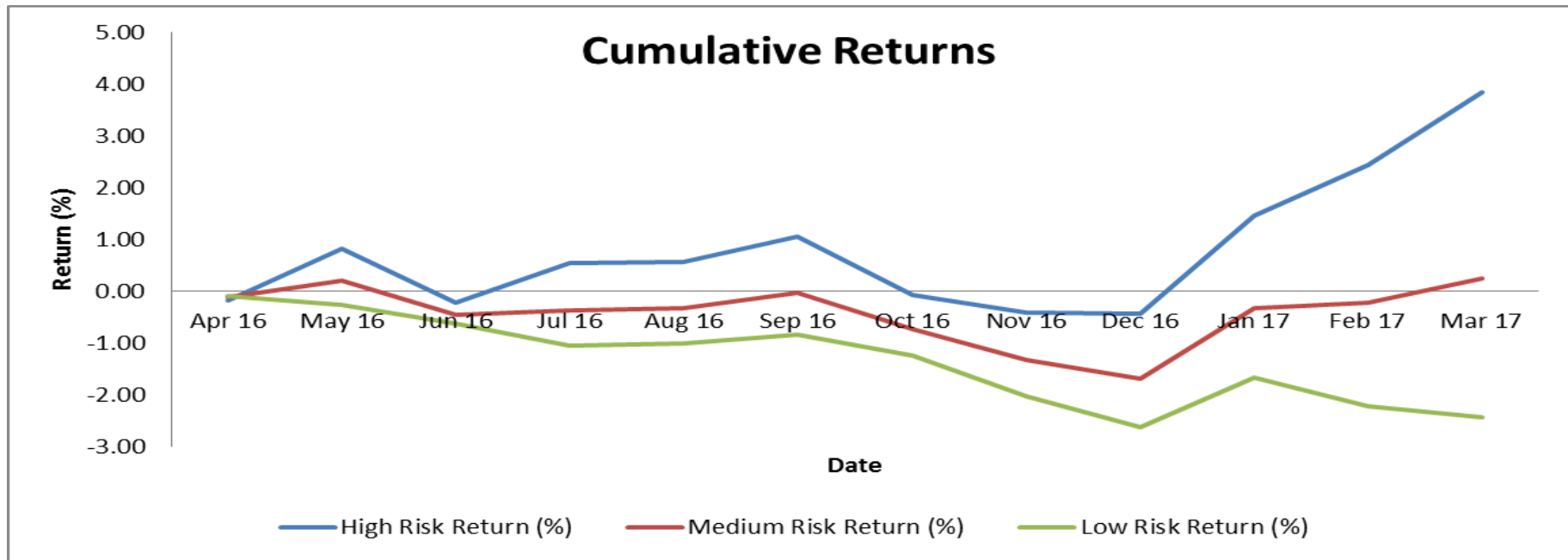
Asset Class	Equity	Fixed Income	Liquidity
Low Risk Profile	25%	60 %	15%
Medium Risk	40 %	45%	15%
High Risk Profile	60 %	25 %	15 %



Model Portfolio	Ex-Ante Tracking Error	Equity contribution	Fixed Income contribution	Liquidity Contribution
Low Risk Profile	2.00	25%	73%	2%
Medium Risk Profile	2.72	61%	41%	-2%
High Risk Profile	5.10	75%	27%	-2%

MODEL PORTFOLIOS RISK AND PERFORMANCE ATTRIBUTION

Has my allocation strategy paid off?



RETURN ATTRIBUTION ALIGNED WITH RISK

Are my risk drivers contributing to portfolio return?

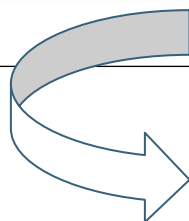
Model Portfolio	Ex ante Tracking Error	Equity contribution	Fixed Income contribution	Liquidity Contribution
Low Risk Profile	2.00	25%	73%	2%
Medium Risk	2.72	61%	41%	-2%
High Risk Profile	5.10	75%	27%	-2%

Analysis Name	Ex post Tracking Error (%)	Equity return (%)	Fixed income return (%)	Liquidity return (%)	Active Return (%)
Low Risk	1.82	-0.66	-1.58	-0.21	-2.45
Medium Risk	1.97	1.42	-0.98	-0.20	0.23
High Risk	3.45	4.2	-0.18	-0.20	3.83

MODEL PORTFOLIOS RISK AND PERFORMANCE ATTRIBUTION

Are my risk drivers contributing to portfolio return?

Medium risk: Performance Attribution	Value
Portfolio Base Return	9.16%
Benchmark Base Return	8.93%
Active Model Base Return	0.23%
Active Currency Return	-1.47%
Active Local Return	1.70%
Allocation	1.89%
Selection	-0.19%



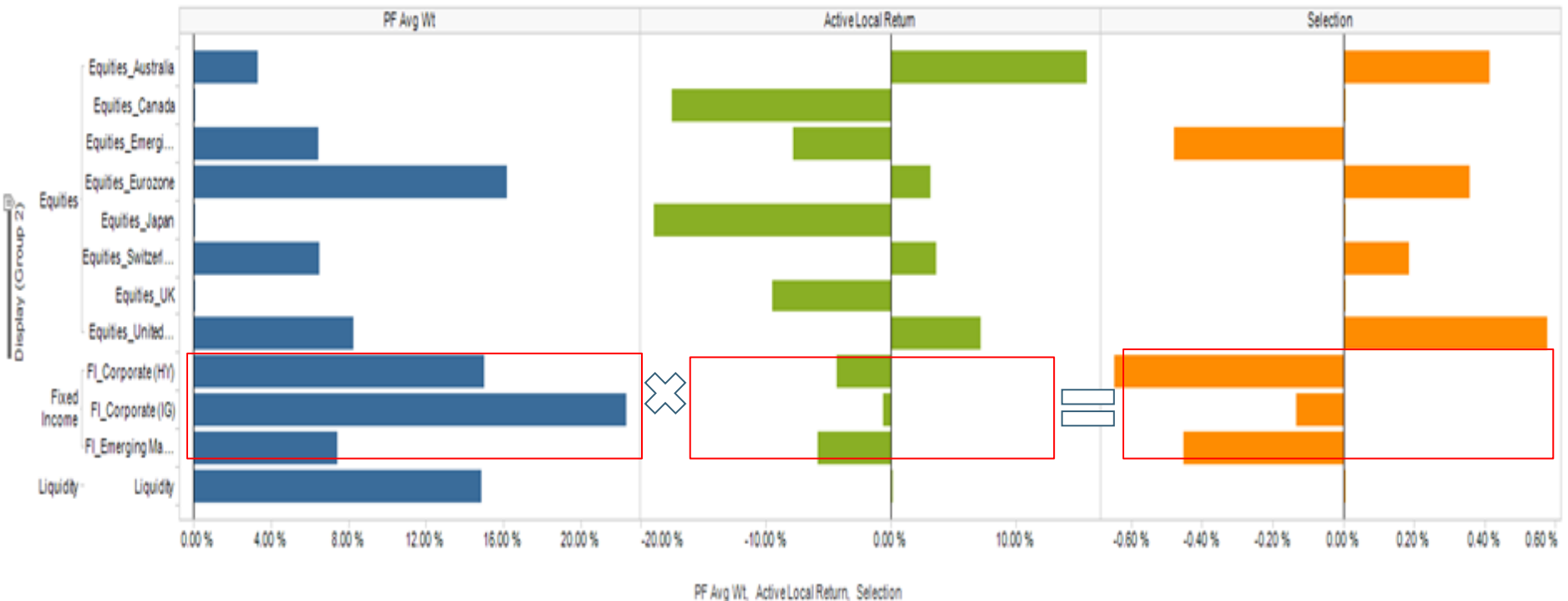
Equities	1.04
Fixed Income	-1.23
Liquidity	0.0

Medium Risk: Risk Attribution	Value
Portfolio Risk	6.79
Benchmark Risk	5.29
Active Risk	2.72
Active Currency Risk Contribution	0.44
Active Local Market Risk Contribution	2.29
Allocation Risk Contribution	1.36
Selection Risk Contribution	0.92

Next Step: Investigate the drivers of Fixed Income and Currency returns

MEDIUM RISK PROFILE: PERFORMANCE ATTRIBUTION

Selection Effect



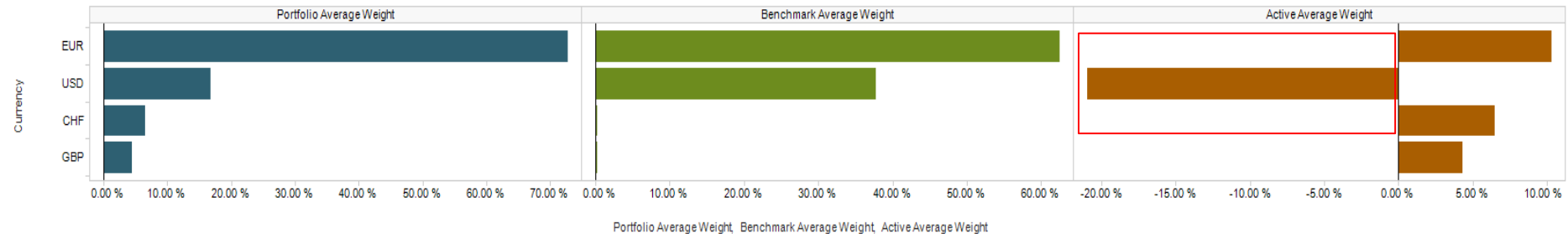
How can we enhance the performance of the model portfolio?

MEDIUM RISK PROFILE: CURRENCY ATTRIBUTION

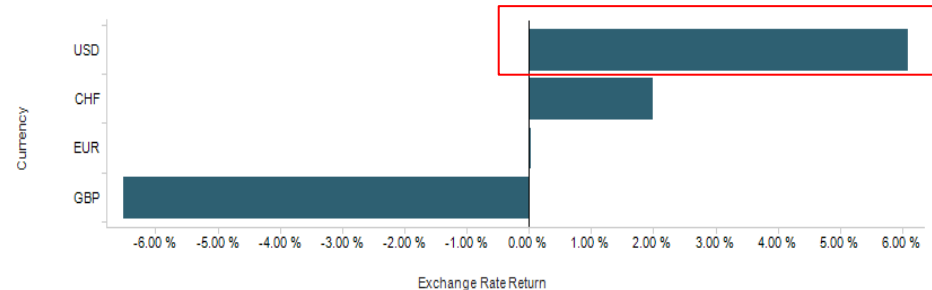
Currency Attribution

Currency	Portfolio Average Weight	Benchmark Average Weight	Active Average Weight	Exchange Rate Return	Portfolio Model Base Return	Benchmark Model Base Return	Active Model Base	Portfolio Local Return	Benchmark Local Return	Active Local Return	Portfolio Currency Return	Benchmark Currency Return	Active Currency Effect
TOTAL	100.00 %	100.00 %	0.00 %		9.16 %	8.93 %	0.23 %	8.34 %	6.64 %	1.70 %	0.79 %	2.19 %	-1.47 %
USD	16.65 %	37.62 %	-20.97 %	6.07 %	23.25 %	19.92 %	3.33 %	16.19 %	13.06 %	3.14 %	0.97 %	2.19 %	-1.28 %
EUR	72.64 %	62.38 %	10.26 %	0.00 %	4.67 %	2.75 %	1.93 %	4.67 %	2.75 %	1.93 %	0.00 %	0.00 %	0.00 %
GBP	4.28 %	0.00 %	4.28 %	-6.52 %	22.39 %	0.00 %	22.39 %	30.92 %	0.00 %	30.92 %	-0.31 %	0.00 %	-0.33 %
CHF	6.43 %	0.00 %	6.43 %	1.98 %	17.75 %	0.00 %	17.75 %	15.47 %	0.00 %	15.47 %	0.13 %	0.00 %	0.13 %

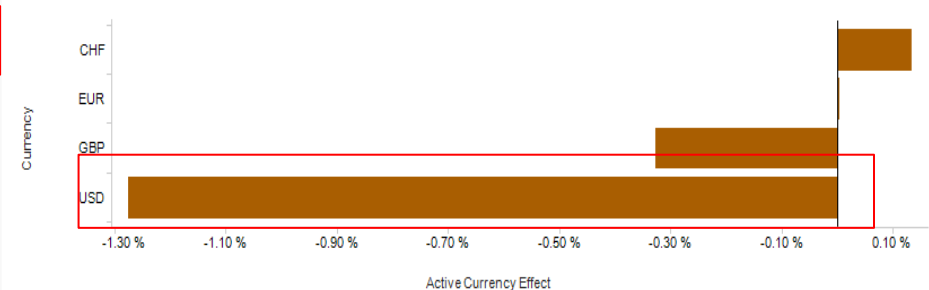
Currency Exposure



FX Return



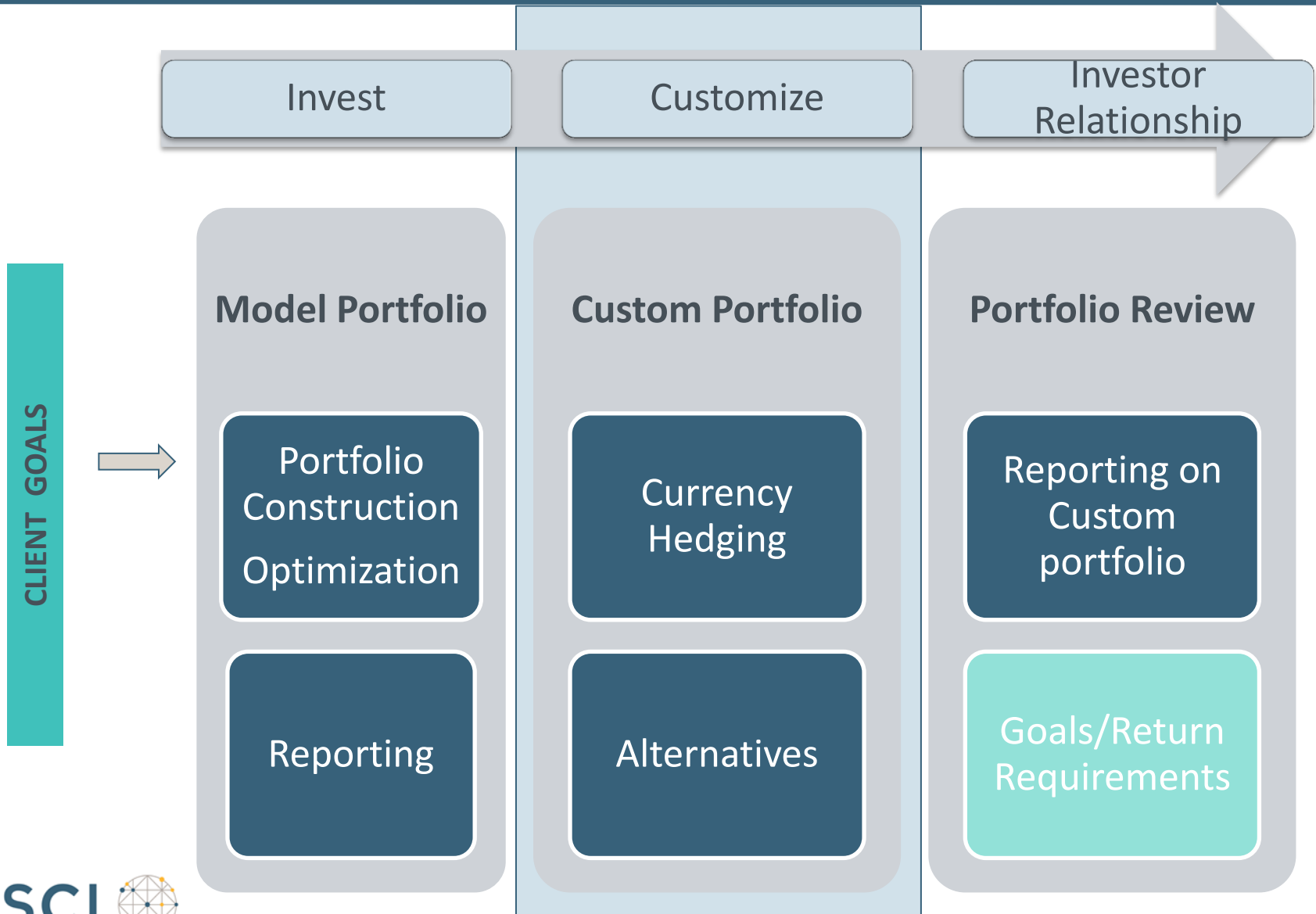
Active Currency Effect



How can we hedge the currency exposures of my portfolio?

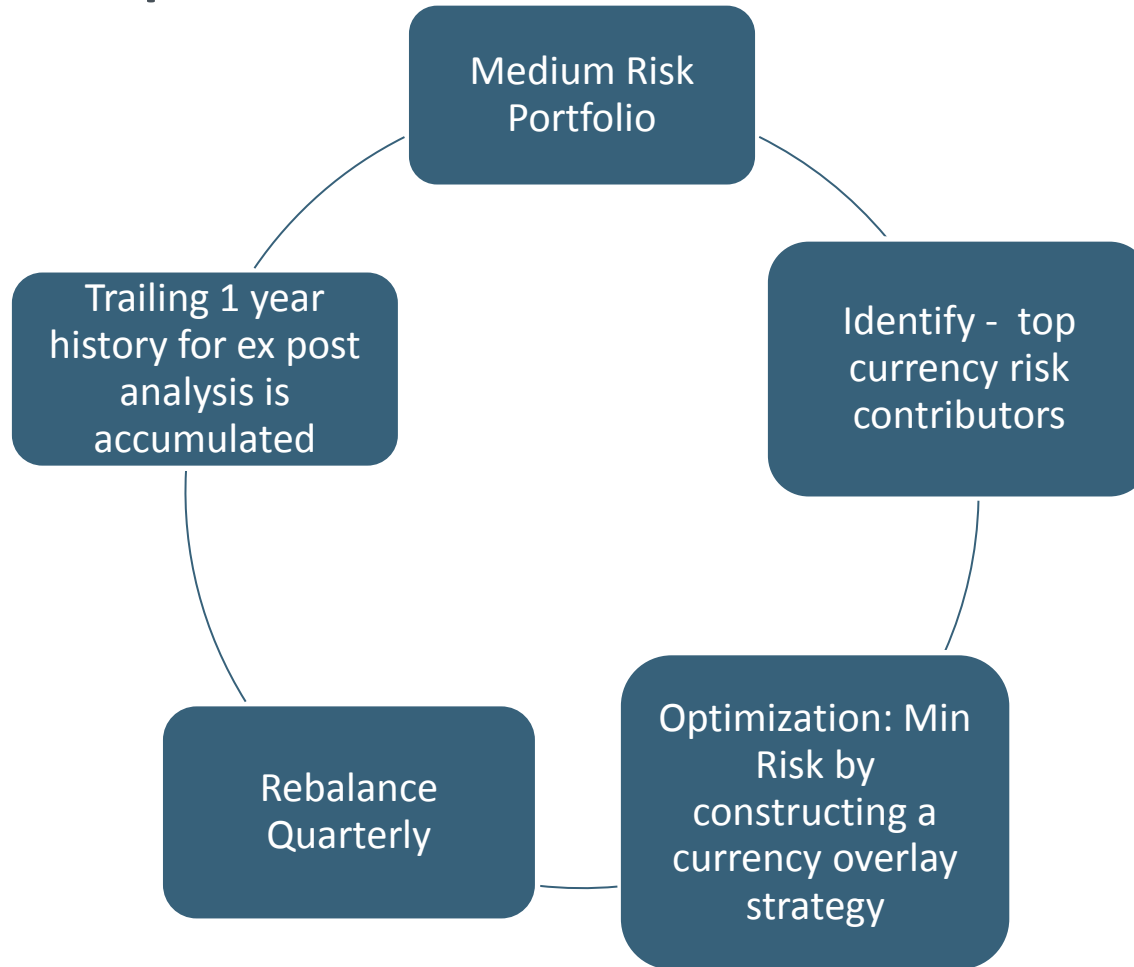
CREATE DISCRETIONARY CLIENT PORTFOLIOS

CLIENT SPECIFIC CUSTOMIZATION

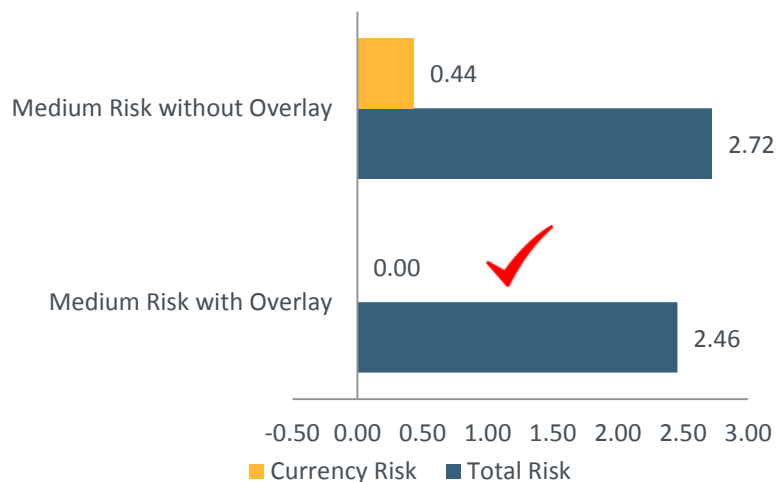


CURRENCY OVERLAY

Use Case: Client wants to remove currency exposures from the model portfolios.

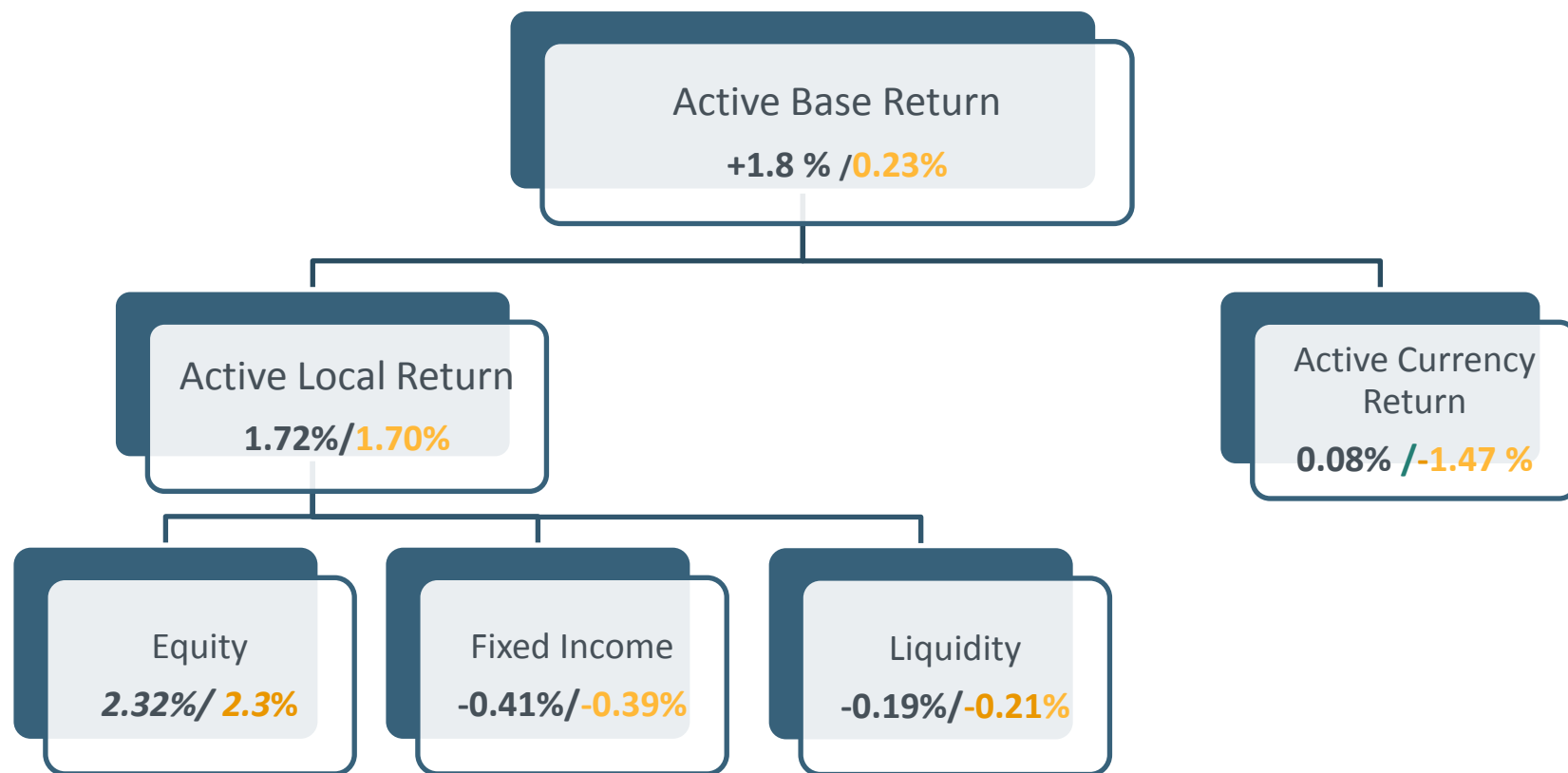


EX ANTE RISK COMPARISON: *RISK DELTA ANALYSIS*



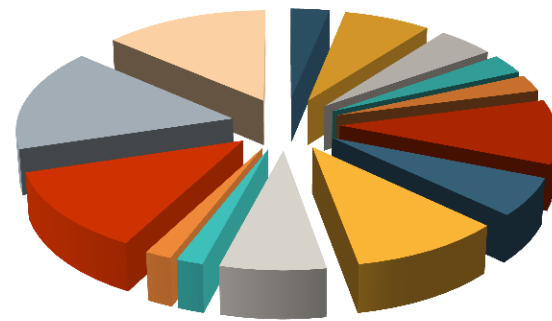
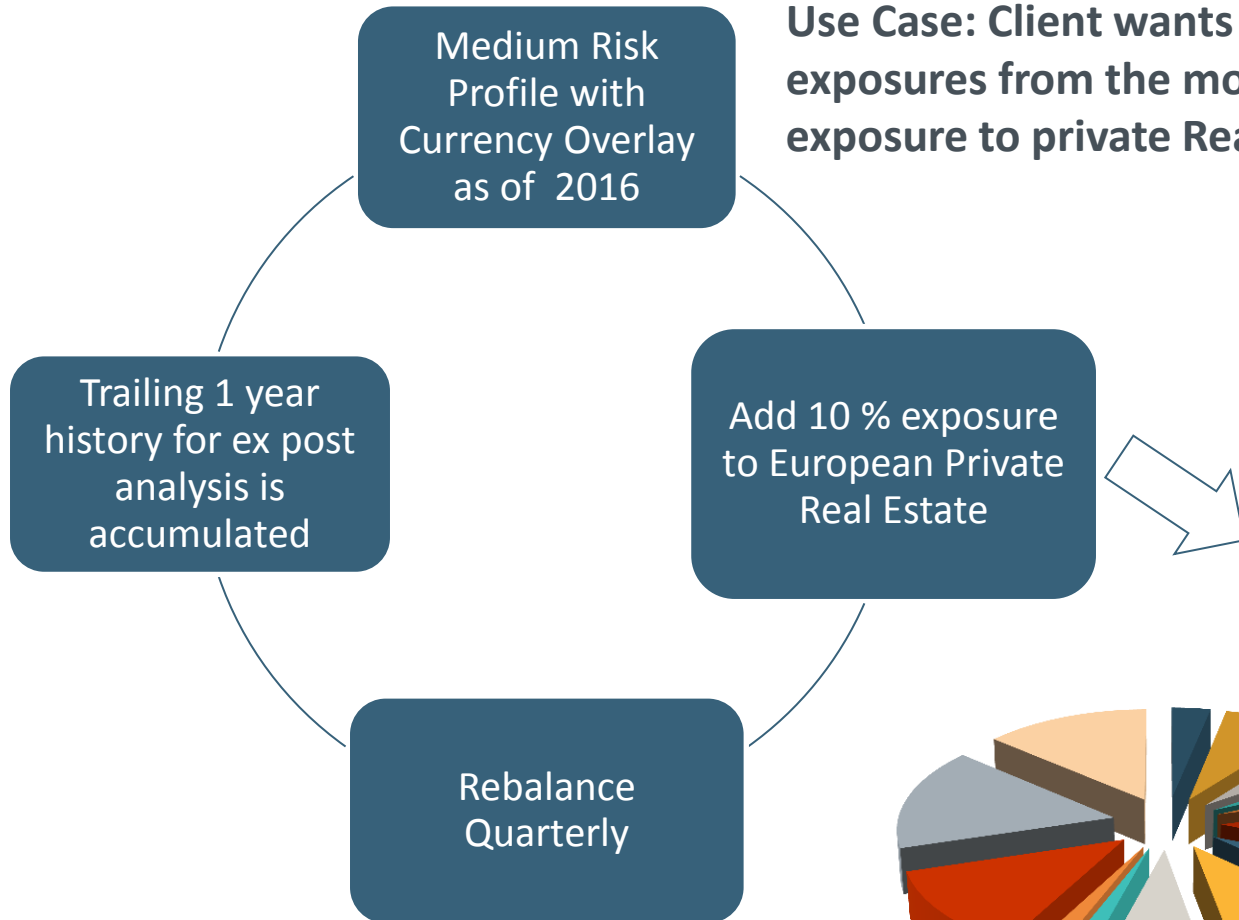
Risk Source	Active Risk with Overlay	Active Risk without overlay	Active Risk Change	Active Exposure	Active Volatility	Active Correlation
Total Risk	2.46	2.72	-0.27 ✓	-0.26	0.02	-0.03
Local Market Risk	2.46	2.29	0.17	0.00	0.00	0.17
Currency Risk	0.00 ✓	0.44	-0.44 =	-0.26 +	0.02 +	-0.20

CURRENCY OVERLAY PORTFOLIO RETURN ATTRIBUTION



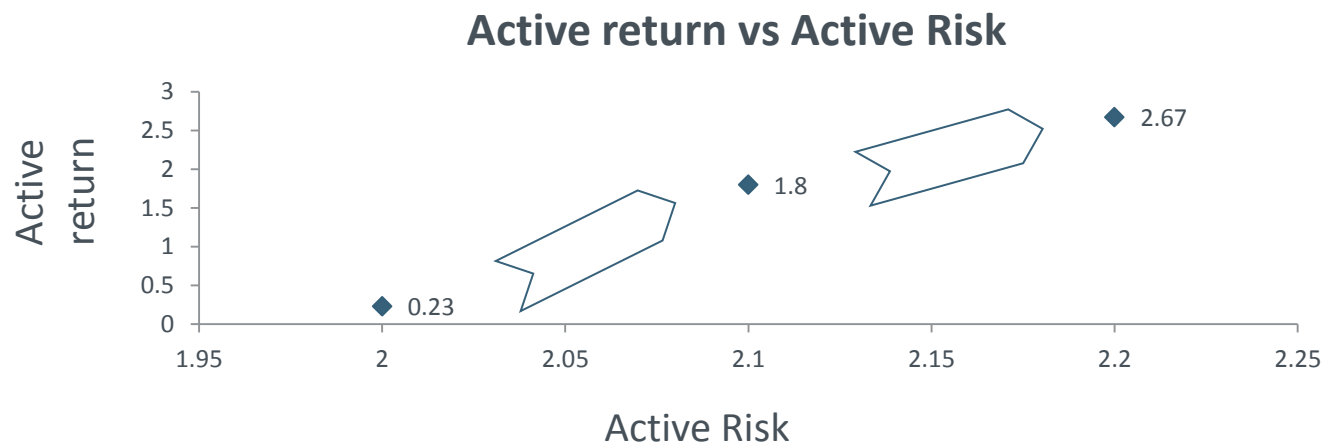
EXPOSURE TO PRIVATE REAL ESTATE PORTFOLIO CONSTRUCTION WORKFLOW

Use Case: Client wants to remove currency exposures from the model portfolios and have exposure to private Real Estate



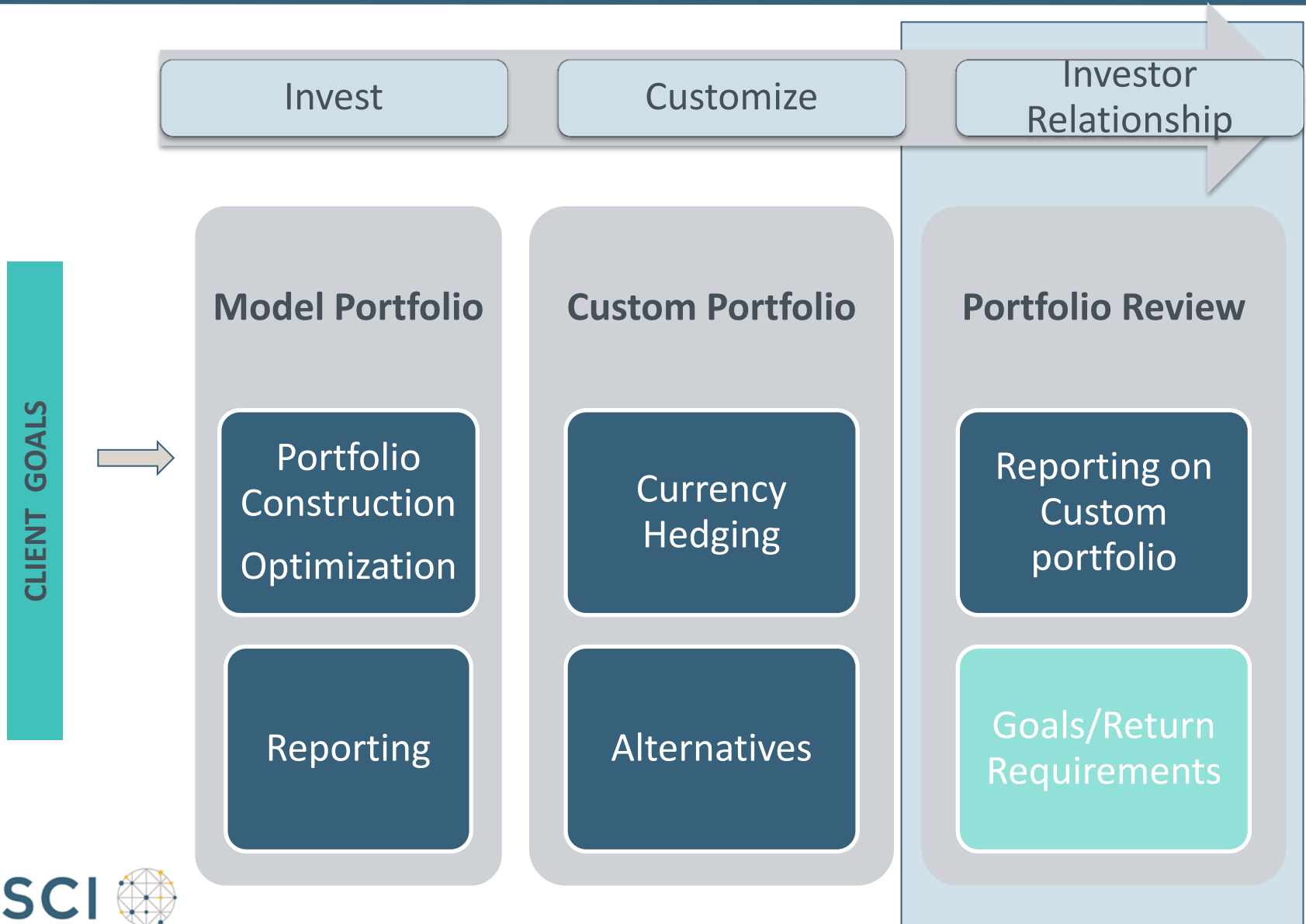
- DEU Hotel Core
- DEU Industrial Core
- DEU Office Berlin Core
- DEU Office Cologne Core
- DEU Office Dusseldorf Core
- DEU Office Frankfurt Core

EX POST COMPARISON OF PERFORMANCE

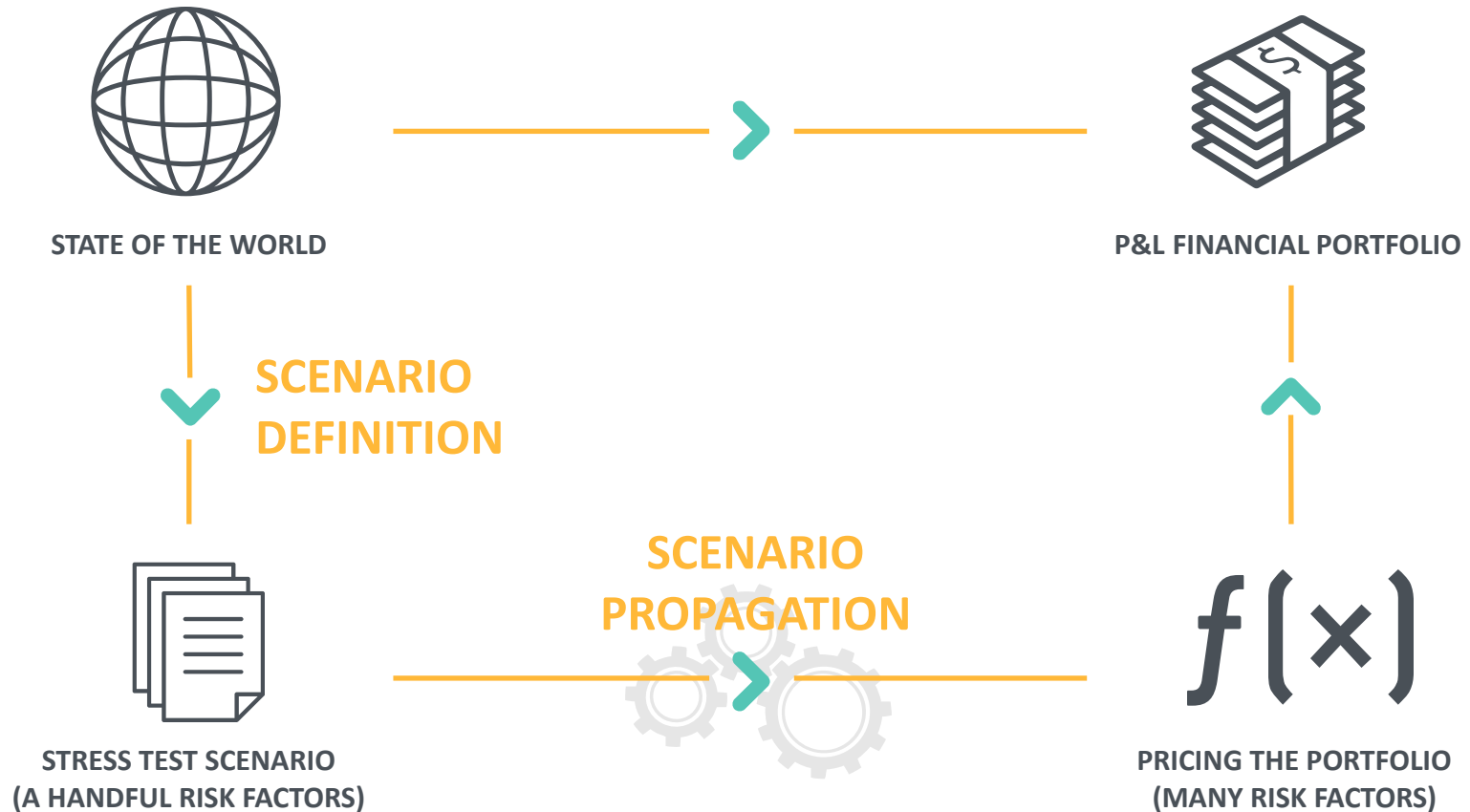


Statistic	medium risk	medium risk with overlay	medium risk with overlay and PRE
Portfolio Volatility (%)	4.65	4.47	4.53
Tracking Error (%)	2.0	2.1	2.2
Active return	0.23	1.8	2.67
Sharpe Ratio	2.0	1.8	2.0
Information Ratio	0.1	0.9	1.2

CLIENT REPORTING



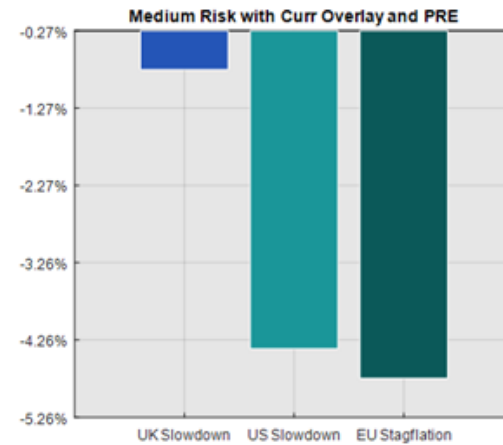
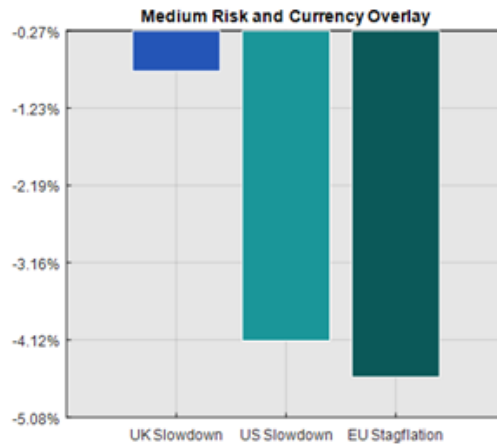
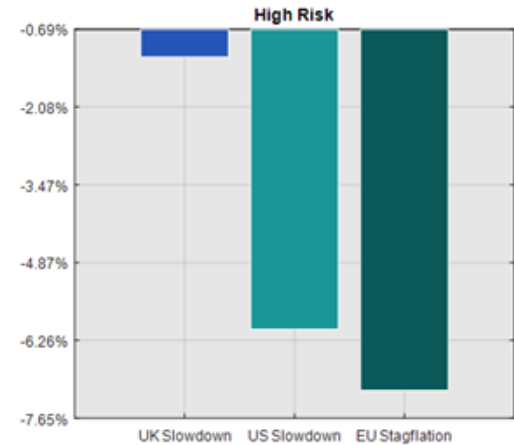
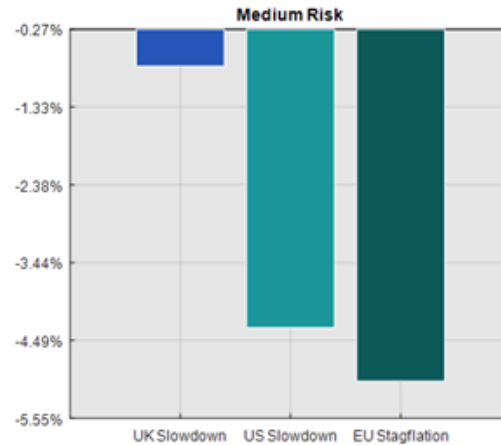
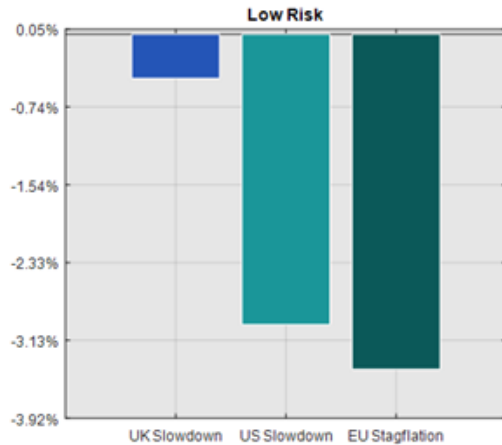
WHAT IF: A TWO STEP PROCESS



SCENARIO ANALYSIS

- We evaluated three forward looking macroeconomic scenarios:
 - US Slowdown
 - UK Slowdown
 - EU Stagflation
- Portfolio was evaluated against historical scenarios as well to highlight vulnerabilities.

FORWARD LOOKING STRESS TEST

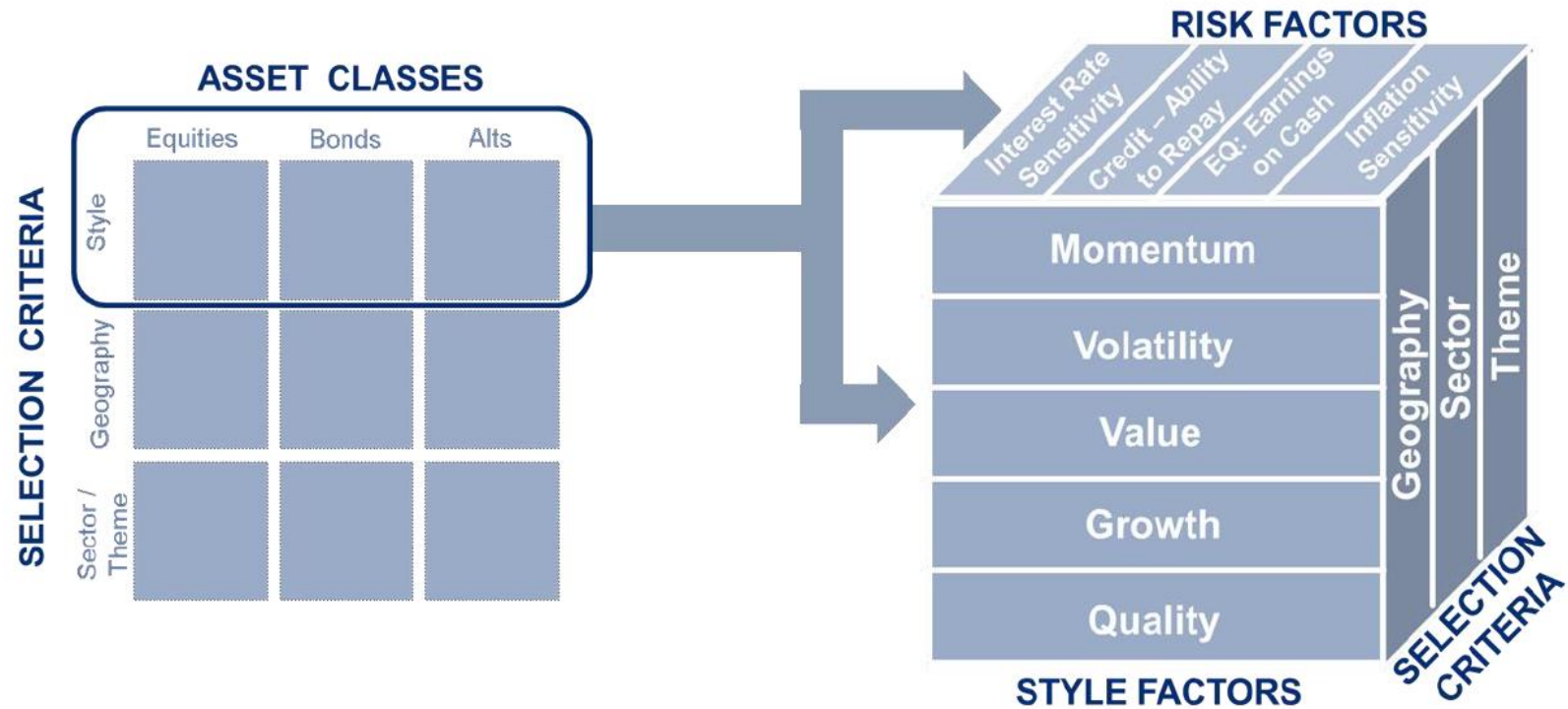


CLOSING REMARKS

SUMMARY

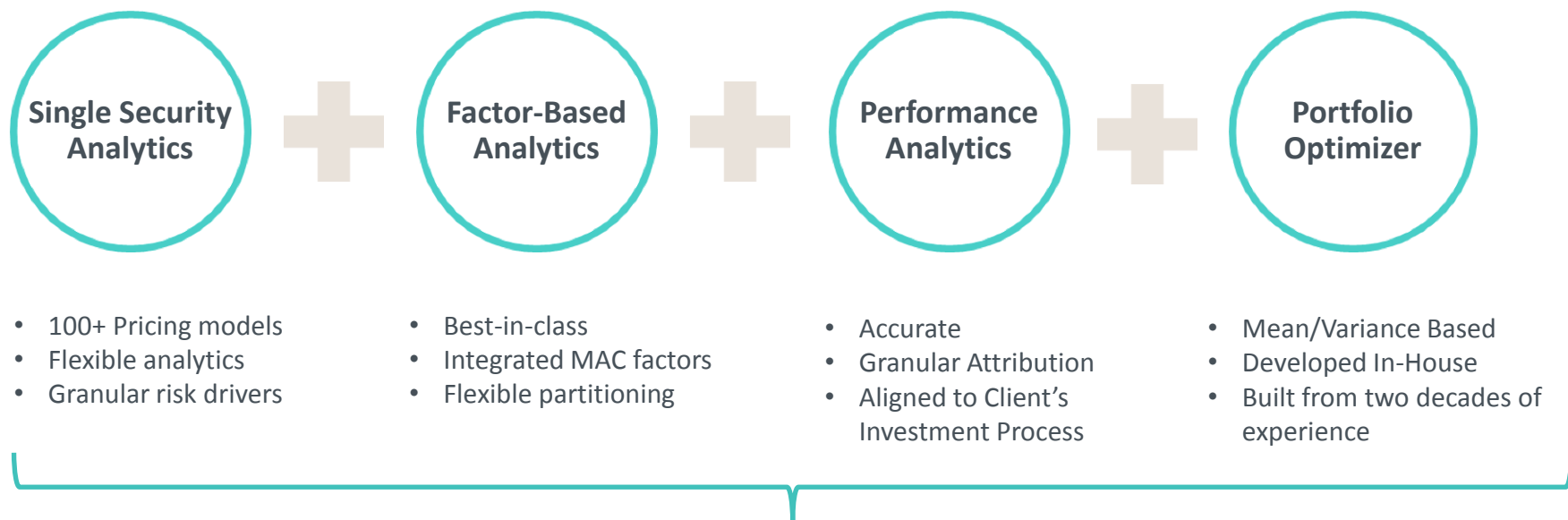
- ✓ Analytic framework for portfolio construction
- ✓ Quantitative Portfolio construction workflow
 - ✓ Creating Discretionary portfolios
 - ✓ Measure drift of discretionary portfolios from benchmarks & model portfolios
 - ✓ Impact of market scenarios
 - ✓ Understand the drivers of Risk and Return
 - ✓ Create Advisory portfolios (FX Hedging and Alternative investing)
 - ✓ Understand the drivers of Risk and Return
- ✓ Communicate investment outcomes and decisions with forward looking views of the market

MODEL PORTFOLIO CONSTRUCTION



Source: Citi Business Advisory Services

AN INTEGRATED VIEW OF RISK AND PERFORMANCE



The essential tools for ex-ante portfolio construction and ex-post performance evaluation

ABOUT MSCI

For more than 40 years, MSCI's research-based indexes and analytics have helped the world's leading investors build and manage better portfolios. Clients rely on our offerings for deeper insights into the drivers of performance and risk in their portfolios, broad asset class coverage and innovative research.

Our line of products and services includes indexes, analytical models, data, real estate benchmarks and ESG research.

MSCI serves 97 of the top 100 largest money managers, according to the most recent P&I ranking.

For more information, visit us at www.msci.com.

NOTICE AND DISCLAIMER

This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the “Information”) is the property of MSCI Inc. or its subsidiaries (collectively, “MSCI”), or MSCI’s licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the “Information Providers”) and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or disseminated in whole or in part without prior written permission from MSCI.

The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.

The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.

Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.

Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.

The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.

None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.

It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, “Index Linked Investments”). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.

Index returns do not represent the results of actual trading of investible assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.

The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.

Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.

Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on www.msci.com.

MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.’s revenue includes fees based on assets in Index Linked Investments. Information can be found in MSCI Inc.’s company filings on the Investor Relations section of www.msci.com.

MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Except with respect to any applicable products or services from MSCI ESG Research, neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI’s products or services are not intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Issuers mentioned or included in any MSCI ESG Research materials may include MSCI Inc., clients of MSCI or suppliers to MSCI, and may also purchase research or other products or services from MSCI ESG Research. MSCI ESG Research materials, including materials utilized in any MSCI ESG Indexes or other products, have not been submitted to, nor received approval from, the United States Securities and Exchange Commission or any other regulatory body.

Any use of or access to products, services or information of MSCI requires a license from MSCI. MSCI, Barra, RiskMetrics, IPD, FEA, InvestorForce, and other MSCI brands and product names are the trademarks, service marks, or registered trademarks of MSCI or its subsidiaries in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and Standard & Poor’s. “Global Industry Classification Standard (GICS)” is a service mark of MSCI and Standard & Poor’s.