Guiding Pension Fund Portfolios Through Regime Shifts

Maarten Nederlof Head of Portfolio Solutions Neuberger Berman



Overview

- Investing at a crossroads
- How recent shifts have thrown portfolios off balance
- How we measure factor risk and regime sensitivities
- Measuring the alpha of active and passive portfolios
- Deciding which alphas are worth the risk
- How to focus on the highest-conviction ideas



NEUBERGER BERMAN

Investing at a crossroads

OUTLOOK ADAPT to Today's New Challenges	OUTLOOK ADAPT to Today's New Challenges	
---	---	--

RETURNS	MIND the Gap	
---------	--------------	--

RISK	DIVERSIFY Differently	
------	------------------------------	--





Investing at a crossroads



Shorter and More Volatile Cycles

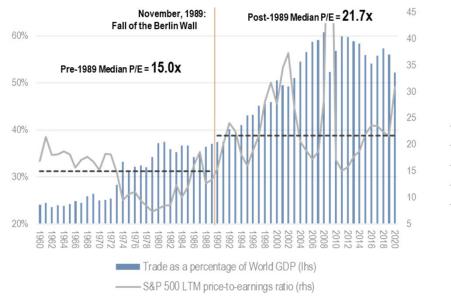




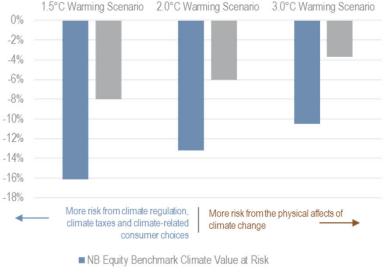


Adapt to today's challenges

U.S. EQUITY MARKET MULTIPLES AND WORLD TRADE, PRE- AND POST-1989



EQUITY AND FIXED INCOME CLIMATE VALUE AT RISK IN THREE DIFFERENT GLOBAL WARMING SCENARIOS



■ NB Fixed Income Blended Benchmark Climate Value at Risk

Source: World Bank, Robert Shiller, Neuberger Berman. LHS data as of December 2020. The pre- and post-1989 median price-to-earnings ratios were calculated by taking the mean average of 12 monthly readings for last-12-month earnings per share for each calendar year, and calculating the median average of those calendar-year readings for the two periods. RHS data as of August 2022. Neuberger Berman has implemented top-down scenario analysis for modelling transition risks (business risks associated with the net-zero transition), physical risks (from the impact of extreme weather events, wildfires and floods), regulatory costs and commercial opportunities at the company level, in line with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD), for different levels of global warming above pre-industrial temperatures. Different securities and companies will have varying levels of exposure to physical risks depending on the nature of their business models and physical locations. For illustrative purposes only. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed or any historical results. Indices are unmanaged and not available for direct investment. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results**.





Adapt to today's challenges

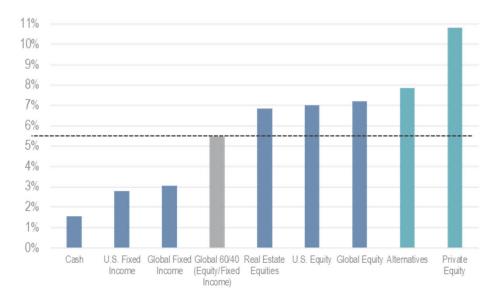
RETURNS, 1960-2012 50 000 45 Last 12 Months P/E Ratio 40 35 30 25 20 15 March 22 P/E 10 Ratio = 22.2 5 -6% -2% 0% 2% 4% 6% 8% 10% 12% 14% 16% 18% Next 10 Years' Annualized Return

BERMAN

NEUBERGER

S&P 500 INDEX, VALUATION MULTIPLES AND SUBSEQUENT 10-YEAR

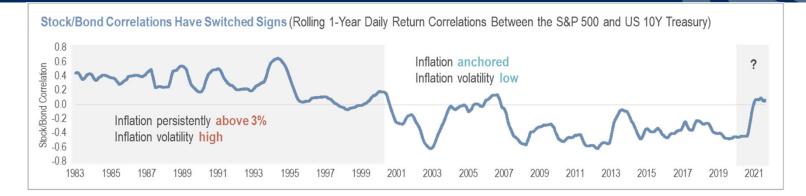
FORWARD-LOOKING ESTIMATED RETURNS

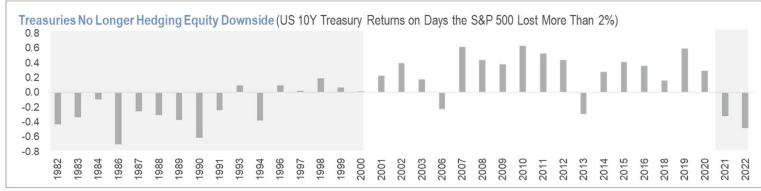


Source: Robert Shiller, Neuberger Berman. LHS as of March 2022. Data excludes the P/E ratios for November 2008 through October 2009, which were extraordinarily high not due to rising valuations but due to the earnings depression that followed the Great Financial. RHS analytics are as of June 7, 2022. Alternatives basket includes hedged strategies(15%), Corre real estate (10%), Value add real estate (10%), Core real estate (30%), Private Equity (30%). The Global 60/40 basket includes the MSCI All Country World Index (60%) and the Bloomberg Global Aggregate Index (40%). IMPORTANT: The performance estimates are hypothetical in nature and reflect the Neuberger Berman's Capital Market Assumptions. The estimates do not reflect actual investment results and are not guarantees of future results. Alternative Assets may include investment vehicles that are subject to investore ligibility restrictions and may not be suitability for all investment results and are not guarantees of future results. Alternative and reflect the presentation for asset class and index definitions, terminology definitions or may listorical results. Indices are unmanaged and not available for direct investment. Investing entails risks, including possible loss of principal. Past performance is no guarantee of future results.



Diversify differently





Source: Bloomberg, Neuberger Berman. Data as of May 31, 2022. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed. Indexes are unmanaged and are not available for direct investment. Investing entails risks, including possible loss of principal. Past performance is no guarantee of future results.



NEUBERGER BERMAN

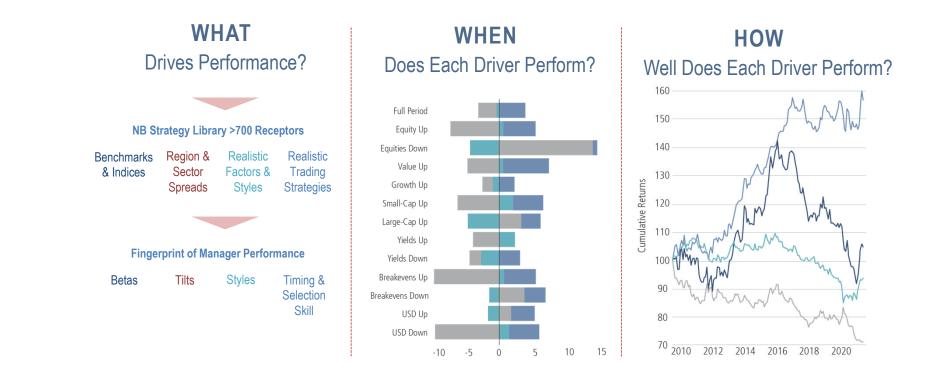
strategy detective®







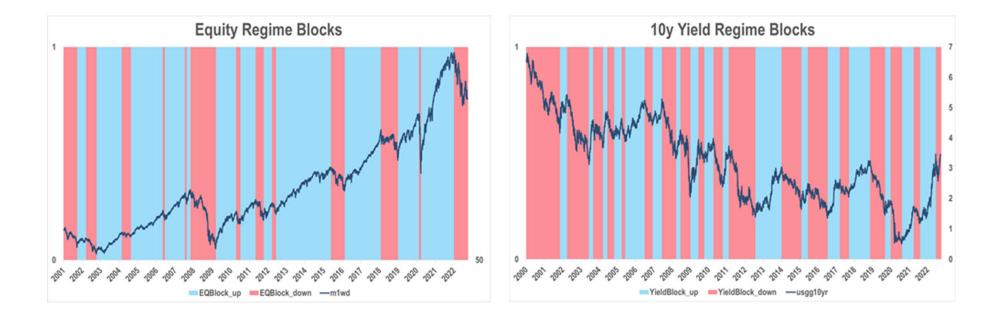
Understanding investment drivers







Define historical regimes

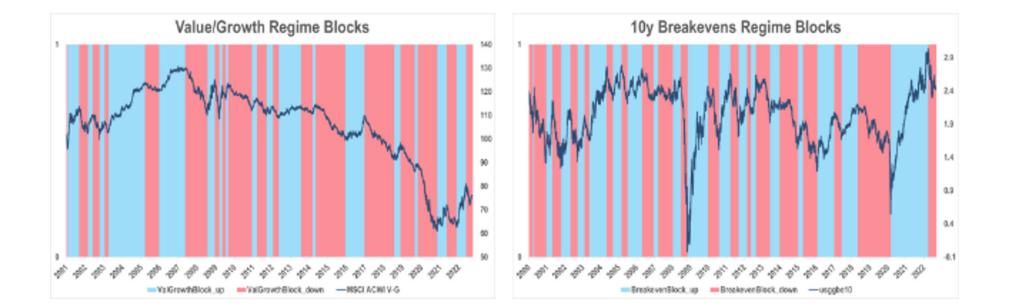


strategy detective® shows conditional historical and attributed performance or "regime analysis" via exhibits which split and analyze the returns and attributed historical manager performance separately during each of two states of the regime in question, defined for an underlying characteristic, in the case of the examples on this page, rising and falling equity market regimes, value vs. growth regimes, rising interest rate vs. falling interest rate regimes and rising breakevens vs. falling breakeve





Define historical regimes



strategy detective® shows conditional historical and attributed performance or "regime analysis" via exhibits which split and analyze the returns and attributed historical manager performance separately during each of two states of the regime in question, defined for an underlying characteristic, in the case of the examples on this page, rising and falling equity market regimes, value vs. growth regimes, rising interest rate vs. falling interest rate regimes and rising breakevens vs. falling breakeve





Layers of risk

- We use our factor model to split the returns of passive and active managers into layers
- As an example, these are the layers we use for equities managers



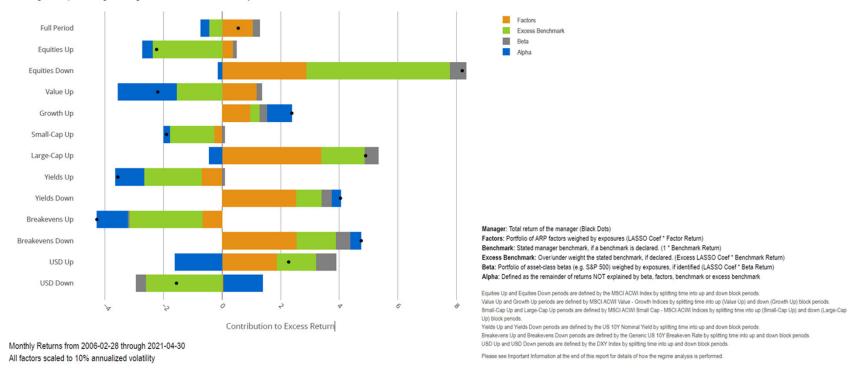
strategy detective modeling is generally manager strategy-specific. This chart is provided as an illustration of how the performance drivers ("ingredients") we strive to detect in different types of managers may vary.





Layers of risk across regimes

Manager 22) Manager Regime Breakout Bar Graph

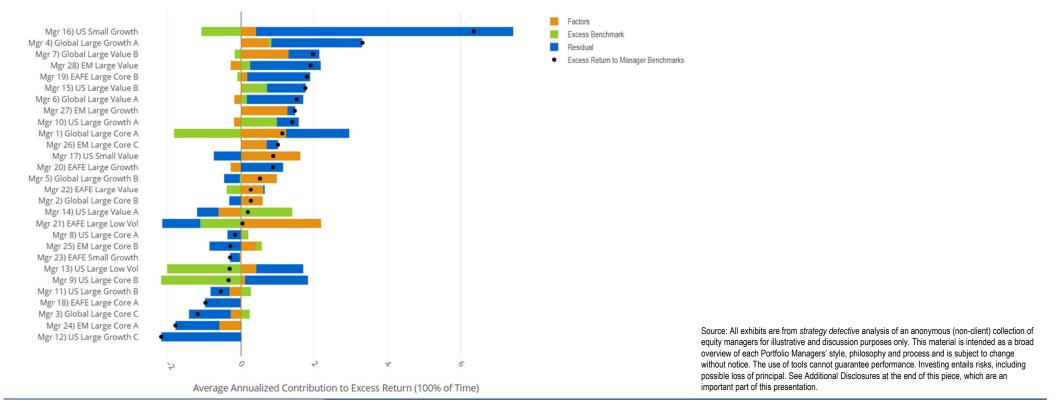






Ranking managers by excess return

Average annualized excess returns, relative to individual manager benchmarks.

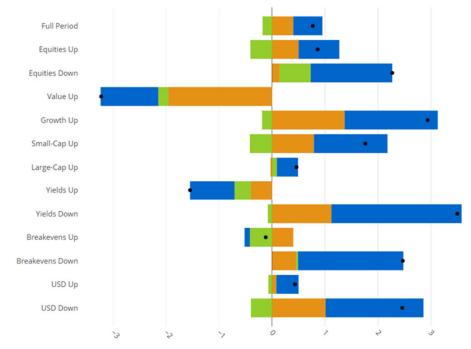






Portfolio-level regime analysis

Average annualized excess returns, relative to individual manager benchmarks.



Average Annualized Contribution to Excess Return

Monthly Returns from Dec 31 2013 through Mar 31 2022



Factors
Excess Benchmark
Residual
Excess Return to Manager Benchmarks

Manager: Total return of the manager (Black Dots) Factors: Portfolio of ARP factors weighed by exposures (LASSO Coef * Factor Return) Benchmark: Stated manager benchmark, if a benchmark is declared. (1 * Benchmark Return) Excess Benchmark: Overiunder weight the stated benchmark, if declared. (Excess LASSO Coef * Benchmark Return) Beta: Portfolio of asset-class betas (e.g. S&P 500) weighed by exposures, if identified (LASSO Coef * Beta Return) Alpha: Defined as the remainder of returns NOT explained by beta, factors, benchmark or excess benchmark

Equities Up and Equities Down periods are defined by the MSCI ACWI Index by splitting time into up and down block periods. Value Up and Growth Up periods are defined by MSCI ACWI Value - Growth Indices by splitting time into up (Value Up) and down (Growth Up) block periods. Small-Cap Up and Large-Cap Up periods are defined by MSCI ACWI Small Cap - MSCI ACWI Indices by splitting time into up (Small-Cap Up) and down (Large-Cap Up) block periods.

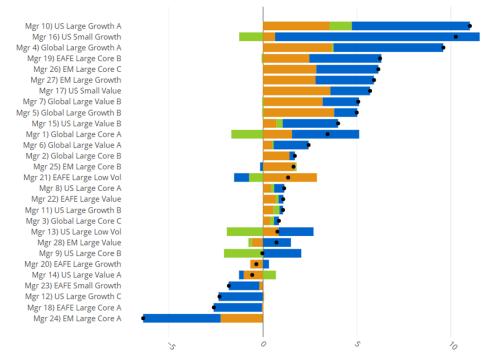
Yields Up and Yields Down periods are defined by the US 10Y Nominal Yield by splitting time into up and down block periods. Breakevens Up and Breakevens Down periods are defined by the Generic US 10Y Breakeven Rate by splitting time into up and down block periods. USD Up and USD Down periods are defined by the DXY Index by splitting time into up and down block periods.

Please see Important Information at the end of this report for details of how the regime analysis is performed.



Growth-Up regime ranking

Average annualized excess returns, relative to individual manager benchmarks.



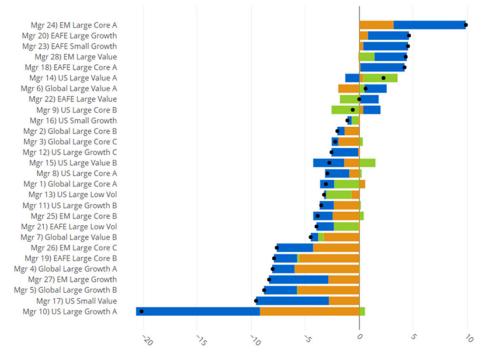
Average Annualized Contribution to Excess Return Growth Up (70% of Time)





Value-Up regime ranking

Average annualized excess returns, relative to individual manager benchmarks.

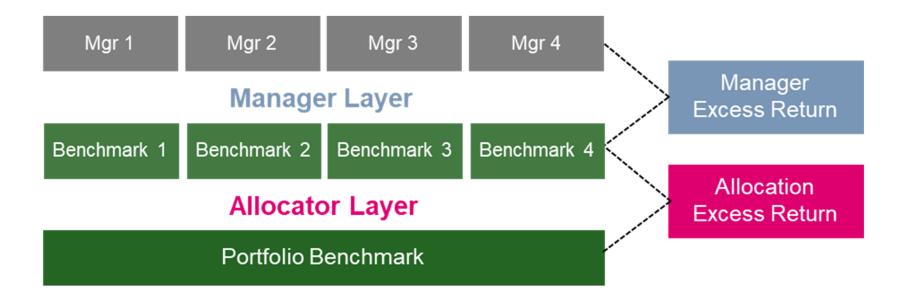


Average Annualized Contribution to Excess Return Value Up (28% of Time)





Measuring the alpha of active and passive portfolios



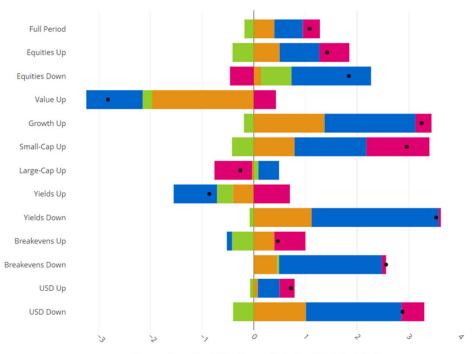
¹ Most of the factors used in strategy detective analysis are implementable and tradable, however, in the case of some factor such as fixed income spreads, we use sector index returns which are adjusted with estimated trading and implementation costs to make them more realistic.





Aggregate regime analysis

Average annualized excess returns, relative to total portfolio benchmark.



Average Annualized Allocation and Selection Effect Contributions

Monthly Returns from Dec 31 2013 through Mar 31 2022



Manager: Total return of the manager (Black Dots) Factors: Portfolio of ARP factors weighed by exposures (LASSO Coef * Factor Return) Benchmark: Stated manager benchmark, if a benchmark is declared. (1 * Benchmark Return) Excess Benchmark: Overründer weight the stated benchmark, if declared. (Excess LASSO Coef * Benchmark Return) Beta: Portfolio of asset-class betas (e.g. S&P 500) weighed by exposures, if identified (LASSO Coef * Beta Return) Alpha: Defined as the remainder of returns NOT explained by beta, factors, benchmark or excess benchmark

Equities Up and Equities Down periods are defined by the MSCI ACWI Index by splitting time into up and down block periods. Value Up and Growth Up periods are defined by MSCI ACWI Value - Growth Indices by splitting time into up (Value Up) and down (Growth Up) block periods. Small-Cap Up and Large-Cap Up periods are defined by MSCI ACWI Small Cap - MSCI ACWI Indices by splitting time into up (Small-Cap Up) and down (Large-Cap Up) block periods.

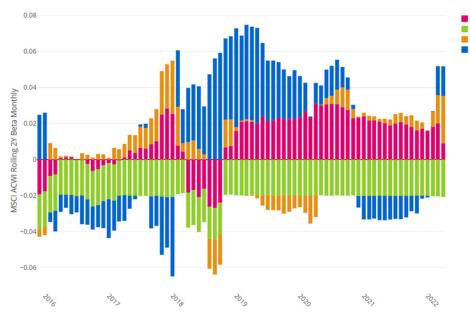
Yields Up and Yields Down periods are defined by the US 10Y Nominal Yield by splitting time into up and down block periods. Breakevens Up and Breakevens Down periods are defined by the Generic US 10Y Breakeven Rate by splitting time into up and down block periods. USD Up and USD Down periods are defined by the UV florks by splitting time into up and down block periods.

Please see Important Information at the end of this report for details of how the regime analysis is performed.



Aggregate portfolio analysis

Benchmark is the weighted sum of individual manager benchmarks. Excess Benchmark, Macro and Factors are relative to individual manager benchmarks.

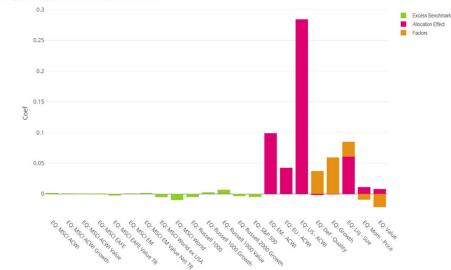


Monthly Returns from 2015-11-30 through 2022-03-31 All factors scaled to 10% annualized volatility

Each bar represents rolling Beta contribution (Mgr Weight * LASSO Coef * 2y Beta to Portfolio Benchmark) from aggregated Benchmark, Macro and Factor exposures.



Factor, Excess Benchmark and Macro exposures are relative to individual manager benchmarks. Allocation Effect exposures are from manager benchmarks relative to the total portfolio benchmark.



Monthly Returns from Dec 31 2013 through Mar 31 2022 All factors scaled to 10% annualized volatility

Allocation Effect

Factors

Residual

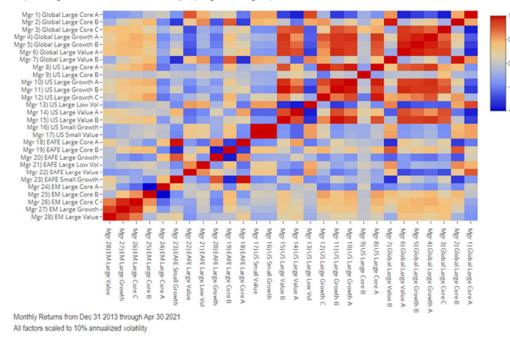
Excess Benchmark

Each bar represents the portfolio's aggregate exposure for each Macro or Factor (Mgr Weight * LASSO Coef)



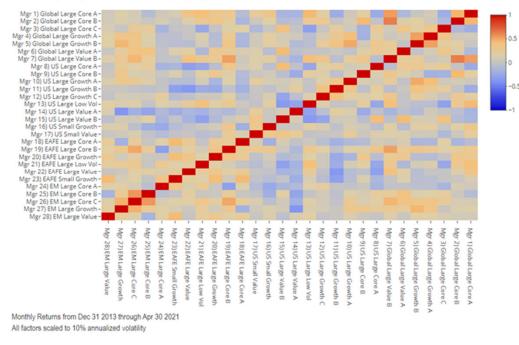
Aggregate portfolio analysis

32) Manager Factors Correlation Graph (Original Weights)



Each point represents a portfolio of ARP factors weighed by exposure (LASSO Coef * Factor Return)

30) Manager Alpha Correlation Graph (Original Weights)



Each point represents the remainder of returns NOT explained by beta, factors, benchmark or excess benchmark





Deciding which alphas are worth it

- How much alpha does each manager contribute?
- What risk is each manager bringing to the portfolio?
- Is each manager doing what they say?
- How sensitive is each manager to various regimes?
- What are my portfolio-wide "implied" views?
- What opportunities am I missing?

NEUBERGER





Important information (1 of 2)

This document is addressed to professional clients only.

United Kingdom: This document is issued by Neuberger Berman Europe Limited, which is authorised and regulated by the Financial Conduct Authority and is registered in England and Wales, at Lansdowne House, 57 Berkeley Square, London, W1J 6ER. European Economic Area (EEA): This document is issued by Neuberger Berman Asset Management Ireland Limited, which is regulated by the Central Bank Ireland and is registered in Ireland, at MFD Secretaries Limited, 32 Molesworth Street, Dublin 2. Switzerland: For qualified investors use only. This document is provided to you by Neuberger Berman Europe Limited is also a registered investment adviser with the Securities and Exchange Commission in the US, and the Dubai branch is regulated by the Dubai Financial Services Authority in the Dubai International Financial Centre. Neuberger Berman Europe Limited is an authorised financial services provider with the South African Financial Sector Conduct Authority, FSP number 45020.

This material is not intended to be, and should not be construed as, discretionary investment, legal, or tax advice and is provided solely on the basis that it will not be regarded as investment advice or any recommendation to take any investment related action. Information and opinions are as of the date indicated, and are subject to change without notice. NB assumes no duty to update this material unless requested. Information contained herein that has been obtained from third party sources is believed to be reliable and is based on information and data provided by you. NB gives no representations or warranties as to the accuracy of such information, and accepts no responsibility or liability (including for indirect, consequential or incidental damages) for any error, omission or inaccuracy in such information and for results obtained from its use. Any actions taken by you that may or may not consider information provided in this material or any other service are at the your sole discretion. If this is not your understanding, we ask that you inform NB immediately upon receipt of these materials.

The benchmarks shown throughout this presentation represent back-tested data using broad-based market indexes, without the impact of investment management fees and expenses that would apply to a client's investment account. The returns data are intended for illustrative purposes only, to show the potential impact of adding allocations to alternative investments to a traditional portfolio or how alternative investments may be used to explain part of the performance of existing portfolios, and do not represent actual client performance or the performance of any advisory service available through NB. Accordingly, they are not tailored to the individual needs of any particular client.

The analysis methodology employed in this material uses statistical techniques to attribute return streams for existing or prospective investment strategies. These statistical techniques compare the target return streams to numerous reference strategies or factors constructed by NB. The selection of reference strategies and the specific statistical techniques applied to any given analysis in these materials are performed by NB to illustrate how these factors might explain the return stream provided to us. The specific selection of factors may vary based on the descriptions of the returns provided by the client, if any descriptions were provided, the length of the return streams during the time period represented by the returns and which version of strategy detective® is used to produce the report. strategy detective® is subject to revision from time to time and changes or revisions in data, methodologies and techniques used to prepare these materials may result.

Regime Analysis

strategy detective® shows conditional historical and attributed performance or "regime analysis" via exhibits which split and analyze the returns and attributed historical manager performance separately during each of two states of the regime in question, defined for an underlying characteristic. For example, the analysis could split the historical manager performance into periods in which the equity markets are rising (a state called "Equity Up") and periods in which the equity markets are falling (a state called "Equity Down"). Each regime analysis has a defined underlying characteristic signal index which drives regime state definitions (eg: an equity market index, interest rate yields, the level of the DXY index), and criteria which define which state each underlying characteristic index is in at any point in time. The states we employ for our analysis are based on a subjective analysis of cycles in each underlying characteristic which is "flagged" to be in either state based on a disciplined assessment process which the NB Portfolio Solutions Team follows by interpreting third party data. In our process, we flag an underlying index as being in one state of required length of trend and the magnitude of required large moves is dependent on the underlying index being considered. We flag each daily move in an underlying index and assign a state for each day. When considering whether a given week or month should be classified as being in one state of the regime or the other, we count how many days fall into each state in a given week or month and assign the week or month to the state represented by the majority of dates within that week or month. For example, if 2/3 of the days in a given month are in the "falling" state, the entire month will be flagged as being in the "falling" state.

The regime state flagging discussed above is subject to variation depending on the underlying index. strategy detective® seeks to show how various characteristics of a manager or portfolio vary across regime states and as such this information should be taken as an approximation and would change if different state assignments were employed. A database of the regime state assignments used for this analysis is available upon request. A graphic summary of the regime states we employed over time is available upon request.





Important information (2 of 2)

The regimes described in these materials are based the following underlying indices with their Bloomberg Tickers <u>underlined</u>: up and down equity markets (The MSCI All Country World Index or ACWI (<u>NDUEACWF Index</u>)), up and down value minus growth (the spread between the MSCI ACWI Value Index (<u>M1WD000V Index</u>) and the MSCI ACWI Growth Index (<u>M1WD000G Index</u>)), large-cap vs. small-cap (the spread between the MSCI ACWI Small-Cap Index (<u>M1WDSC Index</u>) and the MSCI ACWI Index (<u>M1WD000G Index</u>), up vs. down interest rate yields (the level of the 10-year US Treasury Bond (<u>USGG10YR Index</u>)), up vs. down USD (the level of the Trade Weighted Dollar Index or DXY (<u>DXY Index</u>) and up vs. down expected inflation (the level of the breakeven yield between 10yr Treasury Inflation Protected bonds and 10 yr nominal Treasury Bonds (<u>USGGBE10 Index</u>)).

The reference strategies or factors rely on data provided by Bloomberg, Thomson Reuters and CapIQ, and are believed to be reliable. The performance for these strategies is pro forma, in that NB does not currently manage any assets using these indices. In addition, portfolio performance estimates would be different if another inception date were chosen. The inception date in this report is based on data availability. The inception date represents the point where all strategies have a back-test available plus the rolling window that is used to determine the volatility scaling over time. Additional details regarding the data and construction methodology of the reference strategies are available upon request.

Past performance is no guarantee of future results. This material may include estimates, projections and other "forward-looking statements". Portfolio illustrations are only provided to describe certain characteristics of various portfolio models and are based on proxies for investments based on return and descriptive information provided by you, and are subject to the accuracy and completeness of that information. Actual portfolios and results may vary.

This material contains confidential and proprietary information of NB and is intended for the exclusive use of the person to whom it is provided. It may not be modified, sold or otherwise provided, in whole or in part, to any other person or entity without prior written permission from NB.

Neuberger Berman Investment Advisers LLC is a registered investment adviser. The "Neuberger Berman" name and logo are registered service marks of Neuberger Berman Group LLC. strategy detective® risk premium time machine™ and TaxM™ are service marks of Neuberger Berman Group LLC. © 2022 Neuberger Berman Group LLC. All rights reserved. All rights reserved.

NEUBERGER BERMAN



IAPF WEBINAR Guiding Pension Fund Portfolios Through Regime Shifts

We will be start at 2pm If you can see this message, then you will be able to view today's session. Please note although you have been muted by the organiser, this will not affect your ability to hear the session. If you find you cannot hear anything when the session commences, check your audio options on the platform drop down menu or please try logging out and then logging into the session again.



NEUBERGER BERMAN

WELCOME





Jerry Moriarty CEO IAPF



SPONSOR

NEUBERGER BERMAN



PLATFORM FEATURES

• Ask questions / make comment via the 'Questions' feature on the platform drop down menu



 'Handouts' available on the platform drop down menu



 Technical Issues – info@iapf.ie
Log off and log back in again



INTRODUCTION



John O'Callaghan Chief Investment Officer Neuberger Berman Asset Management Ireland Limited (NBAMIL)





SPEAKER



Maarten Nederlof Managing Director Neuberger Berman Asset Management







Delegates pose questions/add comment via the 'Questions' feature on your device





Maarten Nederlof Managing Director Neuberger Berman Asset Management

Jerry Moriarty CEO IAPF





THANK YOU



Maarten Nederlof Managing Director Neuberger Berman Asset Management





SPONSOR

NEUBERGER BERMAN



THANK YOU SPEAKERS AND DELEGATES FEEDBACK | CPD | WATCH BACK ON DEMAND



UPCOMING EVENTS www.iapf.ie

Mailing list

Please log in to our website to elect to receive our emails – use the "Reset my password?" link to have it emailed to you (check your junk mail folder). https://iapf.ie/memberservices/logon/

