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Principles and methodology of research in Global Wealth Management CIO Investment Office

January 2025

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1. Principles of research in Global Wealth Management

1.1. Independence of research

The "Directives on the Independence of Financial Research", issued by the Board of Directors of the Swiss Bankers Association (SBA), came into force on 1 July 2003. They were revised on 1 July 2008 and updated in January 2018. One of their major aims is to avoid or manage any potential conflicts of interest associated with preparing financial research reports, and to require proper disclosure where necessary. Clients who make their investment decisions based in part on recommendations made by financial analysts should be able to rely upon the objectivity, good faith and due diligence of analysts' research.

UBS Global Wealth Management CIO Investment Office (CIO) fully complies with the SBA Directives' requirements. It has strictly defined research principles, processes and methods that support its analysts and other staff to ensure that they meet the compliance rules when producing research. CIO's principles and practices are described below.

1.2. Behavioral and ethical standards at UBS

Financial research analysts are required to observe high standards of integrity, professional- and ethical-behavior. Among other considerations, these standards have the following features:

- Abiding by all relevant laws, rules and regulations (including insider dealing laws) and familiarizing themselves with policies, guidelines, manuals and best business practices;
- Observing the guidelines and principles for optimal ethical and commercial conduct, including identifying and dealing with actual or potential conflicts of interest.

1.3. Organizational and functional principles

To offer independent recommendations focused on UBS Global Wealth Management (GWM), Personal Banking and Corporate & Institutional (P&C) clients, CIO is organizationally, hierarchically and functionally separate from UBS Investment Bank (UBS IB) and UBS Asset Management (AM). CIO is part of Global Wealth Management (GWM) but independent from all departments involved in issuing securities, investment banking, securities trading, sales or credit; and from any other department in UBS where conflicts of interest could occur.

Analysis and recommendations are all based on relevant and publicly available information, as well as on third-party studies, but are made without privileged information.

The remuneration paid to analysts must not depend on the performance or revenues of the above-mentioned units, specific transactions or sales initiatives. Furthermore, other units may not supervise or be involved directly with determining the compensation of any member of the CIO function. Among other factors, the analysts' seniority, experience and overall performance of job-related duties, their abilities and leadership, and the quality and accuracy of their research and analysis may form the basis of their compensation. Factors such as contributions to UBS's investment banking business are never part of analyst compensation.

CIO has processes in place to ensure that financial analysts do not receive privileges, gifts, business entertainment or any other favors from covered companies or other 3rd parties that might create conflicts of interest, influence their independence and harm the reputation of the analyst, CIO and the bank overall. In the same way, it is generally forbidden for individual analysts to hold executive positions or have some other significant influence at the companies they cover. They are also generally prohibited from acquiring, either directly or via third parties, any securities of these companies for their personal accounts.

Research views produced by CIO are confidential until published. When published, those opinions, forecasts and recommendations should be made available simultaneously to other departments in GWM and P&C as well as to external clients. Research publications and recommendations are generally disseminated electronically, and in some cases made available in printed form.

1.4. Dealing with conflicts of interest

CIO employees are obliged to adhere to UBS's principles concerning the identification, handling and disclosing of conflicts of interests. In connection with this, CIO has a robust, global information barrier in place to prevent the flow of price-sensitive, non-public information from CIO to any other departments of UBS. Vital to the information barrier concept is the principle that such protected information must only be shared on a "need to know" basis. Even then it must not cross the barrier unless specified controls or conditions are adhered to by the person(s) transferring the information. Training on conflicts of interest is held regularly.

1.5. Principles of methodology

CIO offers comprehensive research coverage of the main asset classes and markets for UBS GWM clients. The analysis is performed in a consistent framework, and decisions are based on systematic evaluation of drivers. Although valuation of assets plays an important role in the processes, the analysis also considers qualitative elements, momentum and special factors. Environmental, social and governance (ESG) criteria form part of the analysis, where they are considered potentially having a significant impact on the valuation of individual securities.

2. Macroeconomic research

2.1. Macroeconomic research

CIO provides consistent macroeconomic research views on the major economies. It consistently focuses and adapts its research to the needs of its clients and provides in-depth analysis on specific topics.

2.1.1 Methods & processes

CIO economists worldwide provide forecasts on gross domestic product (GDP), growth, inflation and central bank policy. They also offer political analysis for the covered countries in collaboration with other UBS research units. In addition, they provide economic analysis in a variety of thematic research studies in collaboration with CIO analysts from the different asset class teams.

Economists make use of the views of other research houses, direct exchanges with policymakers, academic journals and conferences, and their own proprietary econometric models to make their forecasts. In the case of Switzerland, CIO economists also conduct their own business surveys among Swiss corporations on an ad hoc basis.

Surveys and models are regularly updated and backtested. Also, model results and proposed forecast changes are challenged in regular meetings among CIO economists and in bilateral talks with respective colleagues as well as other analysts. Macroeconomic forecasts are presented in various publications.

2.2. Foreign exchange research

CIO provides targeted, foreign exchange (FX) recommendations, guidance and communication to UBS clients.

2.2.1 Methods & processes

FX investment views are provided for targeted investment horizons of one month up to multi-year positions. These views include generic recommendations on structured products (not specific to a certain Valor) as well as positioning in the underlying FX market. CIO uses a standard set of econometric models to evaluate exchange rates (purchasing power parity, interest rate parity, risk indicators and others). CIO consults a variety of brokers, including UBS Investment Bank, and evaluates their ideas before formulating its forecasts and recommendations.

2.2.2 Forecasts & strategies

CIO makes forecasts on commonly traded currency pairs and presents trading strategies wherever it sees an opportunity in the market. When evaluating the opportunity, CIO looks at the spot exchange rate, interest rate differentials and assesses market volatilities.

2.3. Fixed income research

2.3.1 Methods & processes

CIO provides medium and long-term investment views on fixed income markets. These views include broad recommendations reflecting our expectations for the development of interest rates and credit spreads. CIO employs models based on macroeconomic variables as well as other important variables such as valuation, market technicals and central bank activity that influence markets. As an example, specific variables may include bank lending standards, purchasing managers' indices (PMIs), ratings trends, earnings expectations, leverage trends or credit growth. CIO also consults a variety of market participants such as asset managers and sell side researchers and evaluates their ideas before formulating its proprietary forecasts and recommendations.

2.3.2 Forecasts

CIO makes interest rate forecasts. CIO forecasts two-year, five-year and 10-year government bond yields for a standard set of developed market currencies, as well as providing forecasts for additional points on the rate curves of the most relevant markets. CIO also makes credit spread forecasts for a standard set of markets, including USD and EUR corporate bonds.

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3. Research on traditional asset classes

3.1. Credit research

CIO provides a credit view and investment opinion on issuers and specific instruments that are under coverage.

3.1.1 Methods & processes

To assess the credit quality of an issuer, the research analysts analyze financial, operational and other relevant risk factors, including material sustainability risks, to determine its creditworthiness. These risks and other factors are assessed and reviewed regularly. Depending on the sector and issuer type, different analytical frameworks are used. Analysts may refer to rating agencies' methodologies or refine them if necessary. The main factors analyzed relate to financial, industry, business, strategic, liquidity, event and legal risks as well as further risks or other technical factors.

CIO maintains an independent credit view. Rating agency ratings are used as a reference and analysts can indicate their view on likely rating actions by major rating agencies.

Credit risk assessments may differ according to the instrument types – such as subordinated, secured, covered or guaranteed bonds – of an issuer. CIO provides a credit risk view for all instrument types it covers from an issuer.

The CIO risk assessment for a specific instrument type defines the peer group being used to compare the relative attractiveness of individual instruments. CIO bond recommendations reflect both the fundamental credit view as well as the valuation of specific bonds.

3.1.2 Credit risk flags

CIO attaches a credit risk flag to the instruments under its coverage. Credit risk is assessed based on the remaining tenor and / or instrument type. The flag indicates the likelihood that a holder of the instrument will not receive a coupon or principal payment when it comes due. Specifically, we define the different flags as follows:

Green: Very low credit risk
We believe that the probability of debt payments not being made when they come due is very low (cumulative probability of less than 2%).

Yellow: Medium credit risk
We believe that the probability of debt payments not being made when they come due is low to medium (cumulative probability of non-payment between 2% and less than 20%).

Red: High credit risk
We believe that the probability of debt payments not being made when they come due is at least one in five cumulatively.

Because the cumulative probability of failing to make debt payments increases over time, longer-dated bonds have a greater probability of default than shorter-dated ones do. Credit ratings, as provided by rating agencies, capture their current assessment of default risk. However, ratings can change and the likelihood of them doing so typically rises when credit quality is lower. For example, historical average cumulative default rates provided by Moody's suggest that a rating in the Baa category has on average a 1.5% chance of defaulting over a three-year time frame and a 7% chance over 10 years. As a consequence, we frequently assign different credit risk flags to instruments with different terms to maturity.

As an example, if we used historical average cumulative default rates from Moody's for instruments with a remaining term-to-maturity of five to 10 years, our credit risk definition for a green flag would roughly match the historical default rates associated with the agency’s ratings in the high grade segment (minimum rating AA-/Aa3), the yellow flag would correspond with the lower investment grade segment (down to BBB-/Baa3), and the red flag with high yield.

For subordinated and hybrid instruments, which are usually callable and have a remote or no fixed maturity date, we apply one uniform credit risk flag per issuer and instrument type. The idea is to reflect the possibility of contractual trigger events or regulatory intervention occurring. Either can impose losses on bondholders regardless of the remaining term of the instrument or a specific issuer default event.

Credit risk flags only indicate our view of the riskiness of a particular instrument. A green flag does not imply that we regard a particular bond as attractive from a total return perspective. Similarly, a red flag does not suggest that a bond is expensive or should be sold. Credit risk flags should not be seen as recommendations to buy, hold or sell. In fact, any combination of risk flags and relative value recommendations is possible.

3.1.3 UBS credit ratings

For a defined universe of Swiss and Liechtenstein non-financial corporations, CIO provides a UBS credit rating.

The UBS credit rating reflects our view of the creditworthiness of a company, and is consistent with our risk flags. The issuer credit outlook (as defined below) gives guidance on the expected trend in the credit quality of an entity, which could potentially lead to a rating change in the future. Our credit ratings represent long-term (senior) debt ratings. The rating symbols used by UBS are similar to those of rating agencies such as Standard & Poor’s (S&P) and Fitch; however, UBS credit ratings solely reflect UBS’s opinion, and are distinct from evaluations assigned by rating agencies. The rating scale ranges from AAA (strongest credit quality) to D (default), while investment-grade (IG) ratings include classifications from AAA to BBB-.

Our rating assignment combines (past, present and expected future) qualitative and quantitative factors, and is based on publicly available information, including but not limited to (audited) financial reports, complemented by company presentations, management statements and industry research reports. We note that a company might have a stronger or weaker profile when compared to the assigned rating, which could be driven by near-term outlook, temporary impacts or event risk uncertainty. A company's business profile thereby forms the base of our rating assessment. As a rule of thumb, the more cyclical and volatile the industry is, in which a corporate operates, the more conservative we expect the financial profile to be for a given rating.

The rating assessment is generally updated with company events, such as full-year or interim results reporting or other significant credit-relevant news (such as M&A or change in financial policies etc.).

A credit rating is not a recommendation to buy, hold or sell a particular bond, nor is it reflective of market pricing and/or market sentiment. Depending on instrument pricing, all combinations of a credit rating and relative valuation recommendations are possible.

3.1.4 Issuer credit outlook

We complement the instrument-specific risk information of the credit risk flags by indicating our outlook for the credit quality of an issuer over the next 12 months. We use the following terms:

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Improving
We expect the credit profile of the issuer to improve, to an extent that may justify upgrades by rating agencies.

Stable
We do not expect the credit profile of the issuer to change meaningfully.

Deteriorating
We expect the credit profile of the issuer to deteriorate, to an extent that may result in downgrades by rating agencies.

Our issuer credit outlook, like our credit risk flags, offers a view on credit fundamentals, not the relative or absolute attractiveness of a debt security or its issuer. Depending on instrument pricing, all combinations of an issuer credit outlook and relative valuation recommendations are possible.

3.1.5 Valuation views

The different types of bond risk – such as credit risk, duration risk and foreign exchange (FX) risk – require investors to understand the context in which we express a recommendation. Most CIO bond recommendations reflect a relative preference within a defined sample of comparable instruments (see "Relative value bond recommendations" below for details).

Our recommendations also need to reflect the different time frames that various types of investors favor. We cater to the shorter-term, trading-oriented perspective as well as a long-term, buy-and-hold approach. We believe that the latter is most sensible for highly-rated instruments, whose credit quality rarely declines drastically and whose returns often fail to compensate investors for the cost of switching among them. Therefore, our buy lists for developed market high grade and investment grade bonds, like the Bond Top List and the Bond List Other Currencies, have a longer-term investment horizon. For more volatile investments, like developed market high yield bonds and subordinated bonds, we think that a trading-oriented approach is more appropriate in most cases. So we mainly provide relative value bond recommendations in the High Yield Bond List, the Financial Capital Navigator and other recommendation reports.

Emerging market bonds fall into a wide rating spectrum – roughly two-thirds of the issuers we cover are currently rated investment grade (BBB- / Baa3 or higher); the other one-third belongs to the high yield segment. CIO covers emerging market instruments that are comparatively defensive and suitable for buy-and-hold investors; we also select higher-yielding, more volatile issuers that appeal first and foremost to trading-oriented investors. Regardless of the credit risk level, CIO makes relative value bond recommendations in its Emerging Market Bond Lists.

3.1.6 Relative value bond recommendations

Our relative value bond recommendations are based on an average investment horizon of six to 12 months. They reflect our assessment of a bond's attractiveness relative to comparable instruments under CIO coverage. Comparable instruments typically exhibit similar credit quality, are denominated in the same currency, belong to the same segment of the bond market, and have a similar remaining tenor until redemption.

Views on a particular instrument can change within the six to 12-month time frame, and those that apply to one instrument do not necessarily apply to others of the same issuer. Views on a particular instrument may be withdrawn if it does not have a sizable basket of comparable instruments under CIO coverage.

Attractive

Bonds seen as "attractive" are expected to generate a total return exceeding the average return of comparable instruments.

Our recommendation can stem from a positive view on the issuer's credit profile not fully reflected in the price, unduly high risk premiums, our take on an instrument's call probability, the risk of coupon deferrals, and external factors including regulatory intervention.

Fair
Bonds seen as "fair" are expected to produce a total return broadly in line with the average return of comparable instruments.

Expensive
Bonds seen as "expensive" are expected to earn a total return that is less than the average return of comparable instruments.

Our recommendation can stem from a negative view on the issuer's credit profile not fully reflected in the price, unduly tight risk premiums, our take on an instrument's call probability, the risk of coupon deferrals, and external factors including regulatory intervention.

3.1.7 Sell recommendations

While we expect our relative value preferences to produce a positive excess return, avoiding positions that default or incur large total return losses is of primary importance for a bond portfolio, in our view. When we think the risk of an adverse outcome for an instrument exceeds what is reflected in its current valuation, we issue a Sell recommendation. Such situations can include those in which the instrument appears likely to post negative total returns until redemption, either due to a highly negative yield to maturity or an imminent call at a price below market valuations. Depending on the specific situation, we may refrain from publishing a general Sell recommendation on all bonds of an issuer and only do so for individual bonds, for all bonds of a specific ranking or for all bonds with a specific remaining term to maturity.

3.1.8 Issuer valuation views

In addition to our relative value bond recommendations, we provide issuer valuation views for selected issuers from developed countries. Individual bonds do not necessarily offer a similar relative value across the maturity spectrum and different currencies, so it is often difficult to express a general valuation view on an issuer. However, large, frequent issuers often provide a relatively consistent bond curve in their main issuing currencies. We believe that offering a general valuation view on them provides useful guidance when constructing a bond portfolio or assessing new issues. In the main currencies, our issuer valuation views should reflect our individual relative value bond recommendations, though they will not necessarily do so for every instrument. As a consequence, issuer valuation views cannot simply be broken down to the instrument level. Any combination of our credit risk flags and issuer valuation views is generally possible.

CIO currently provides issuer valuation views for:
- Senior bonds of developed market investment grade financials
- Senior bonds of developed market investment grade non-financial corporates
- Covered bond programs of developed market financials

Preferred list
Bonds of issuers on our Preferred list are generally expected to offer a more attractive relative valuation than those of similarly rated peers.

The most attractive instruments of our preferred issuers are usually included in our buy lists.

Core list
Bonds of issuers on our Core list are generally expected to generate total returns in line with those of similarly rated peers.

Core issuers offer relatively liquid bond curves and comparatively stable credit profiles. Selected bonds of Core issuers are usually included in our buy lists.

Avoid list
Bonds of issuers on our Avoid list are generally expected to offer a less attractive relative valuation than those of similarly rated peers.

Our decision to include an issuer on the Avoid list reflects, in most cases, relative value considerations which can, but do not have to, be based on an expected deterioration in credit quality. To identify this, we refer to our issuer credit outlook.

Issuers on our Avoid list should not be considered for new investments. As long as we have not issued a Sell recommendation, existing positions may be held.

3.2. Equity research

3.2.1 Equity selections

CIO provides research on sectors, countries, regions and themes, publishing respective equity preference lists (EPLs).

The section below explains how equity research analysts define their selections. Additionally, CIO outlines the key considerations in the diligence process and financial analysis that form the reasonable basis for CIO's selections.

We provide two equity selections: Most Preferred (MP) and Least Preferred (LP).

Most Preferred
We expect the stock to outperform the benchmark in the next 12 months.

Least Preferred
We expect the stock to underperform the benchmark in the next 12 months.

Suspended
Sometimes legal, regulatory, contractual or best-business-practice obligations restrict us from issuing research on a company. Such a situation normally stems from UBS Investment Bank's involvement in an investment banking transaction associated with that company.

3.2.2 Equity selection: An assessment relative to a benchmark

Equity selections in equity preferences lists (EPLs) are assessments made relative to a sector/industry, country/regional or thematic benchmark. The chosen benchmark is disclosed on the front page of each EPL. It is also used to measure the performance of the individual analyst. Including a stock in the EPL constitutes neither a view on its expected, standalone absolute performance nor a price target. Rather, EPLs are meant to support the UBS House View, with the stocks included in them selected for their superior risk-return profiles.

Our selection is based on an assessment of the company's fundamental outlook and valuation, the risks, including material sustainability risks, that owning the stock entails and the diversification benefits it provides in an investment portfolio, among many other factors. UBS GWM CIO’s selection methodology enables wealth management clients to invest in a specific investment theme or focus on a sector/industry or country/region. Stocks can be selected for multiple EPLs. For consistency purposes, a stock can only be selected as either Most Preferred or Least Preferred, not both simultaneously. As EPL benchmarks differ, stocks do not need to be included on every list to which they could theoretically be added.

Reasonable basis and due diligence
Every selection must have a reasonable basis. To formulate investment opinions, equity analysts must conduct due diligence, analyze financial data and employ recognized valuation methodologies. With respect to financial data, analysts may decide to develop their own earnings or scorecard models; or they may use each other's analysis and, where appropriate, third-party broker reports and estimates; or they may make use of consensus earnings forecasts.

Due diligence
Analysts perform due diligence in order to build solid, consistent opinions on stocks and to evaluate their attractiveness in the appropriate investment contexts. Equity analysts focus on the following aspects when conducting due diligence:

- Business expectations (revenue and profit growth, margins, cash-flow generation, etc.)
- Valuation (valuation multiples, etc.)
- Business risks (balance sheet ratios, credit ratings, etc.)
- Management quality (management track record, company strategy, etc.)
- Potential catalysts (upcoming news flow, likelihood of M&As, special sector issues, etc.)
- *Due diligence may also include:*
- Reviewing company information, such as annual and interim reports, SEC filings, company website, etc.
- Analyzing third-party research providers, such as brokers, specialized data vendors and others.
- Interviewing company management, industry experts, competitors, customers and suppliers
- Testing different scenarios, such as growth, profitability, capital increase, strategy changes, etc.

Typically, analysts seek to answer questions such as:

- How rapidly will revenues and earnings grow in the coming years?
- Will operating margins improve/decline compared to recent years and will they be above, below or in line with industry averages?
- How will capital expenditures and the free cash flow develop in future?

Equity research analysts commonly use a variety of valuation multiples to determine a stock's valuation. For example, multiples can refer to earnings (P/E, EV/EBITDA), book value (P/BV), revenue (price/sales, EV/sales) or they can be sector-related (P/EmV). Multiples analysis aims to determine whether valuation gaps with peers are justified.

Income-related valuation methods might also be incorporated into the analysis of a stock. Methods include relative valuation models and discount valuation models, which aim at valuing a company based on the present value of its projected cash flows.

3.3. Emerging market research

3.3.1 Methods & processes: Bonds

CIO provides recommendations for fixed income investments in sovereign, quasi-sovereign and corporate bonds in emerging markets with a focus on external debt. CIO defines a universe of securities on which it is able to provide recommendations. CIO regularly communicates its favorite bond picks.

CIO bases these recommendations on various factors, including fundamental, macroeconomic and debt indicators and an assessment of a sovereign's ability and willingness to pay. In the case of corporate bonds, the analysis is based on a company's credit fundamentals as well as on its ability to generate positive cash flows. The analysis is complemented by a valuation analysis that compares the spreads and yields of the bonds against their own historical performance as well as relative to peers in the same ratings bucket.

When selecting specific bonds, CIO looks at the expected return over a forecast horizon of six-to-twelve months.

Credit ratings, credit risk flags and valuations are the same as for the global credit research as covered in chapter 4.1.2-4.1.4.

3.3.2 Methods & processes: Equities

CIO also offers recommendations for emerging equity markets. The advice includes recommendations on countries, sectors, and single stocks. CIO bases emerging market equity recommendations on various factors. The starting point is the assessment of the overall macro-economic outlook and consequences for corporate profits. The next step is a detailed analysis of stock market valuation. The aim of this step is to assess whether the projected macro-economic scenario and our predicted earnings development are already reflected in current stock market prices. The analysis is completed by considering additional factors of potential market relevance, such as political developments, changes in flows, or shifts in market sentiment.

The analytical process leads to country-specific recommendations aimed at achieving relative performance. The forecast horizon for most and least preferred countries, sectors, and stocks varies between three and 12 months. Guidance on specific equity regions and markets that are selected as Preferred, Neutral or Least Preferred are published. These three ratings depend on whether or not we expect the selected equity market to outperform the MSCI EM (XE MSCI EM) equity benchmark (XE Benchmarks) (in USD) over our investment horizon, in which case the Preferred rating is applied, or whether we expect the equity market to move in line with the index (Neutral) or to underperform the index (Least Preferred).

4. Research on additional asset classes

4.1. Commodity research

CIO focuses on thematic, tactical and strategic investments in commodities. It offers cash yield enhancement strategies and trading recommendations for active clients.

4.1.1 Methods & processes

CIO uses several approaches to evaluate commodity prices. Key long-term factors behind commodity prices are supply, demand, inventories, production costs (marginal costs), and regulatory changes. In the short run, risk aversion, foreign exchange movements, investment flows and technical factors are also taken into consideration.

4.1.2 Forecasts

CIO gives one to three months' trading ranges, six and 12 months' price targets (bullish, bearish and sideways on individual commodities like oil), and sets the commodity strategy.

4.2. Hedge fund research

CIO Hedge Fund's objective is to provide a clear view of the strategic role of hedge funds in a portfolio, expected risk and return, recommended allocations within a portfolio context, and current strategy preferences.

4.2.1 Methods & processes

The CIO HF team seeks regular input from a range of internal and external sources, including Global AM's Hedge Fund Solutions, third-party alternative investment managers, other allocators and a range of other market participants. Views and data from these sources are combined with the overall CIO House View to generate recommendations and strategy preferences.

4.2.2 Forecasts

CIO delivers 5y hedge return forecasts to the SAA team using a factor model developed in-house.

We gauge the return potential of the hedge fund industry by disaggregating the expected return into a component that reflects manager alpha and (or alternative risk premiums source) and a component that reflects implicit exposure to traditional markets. To determine the relative importance of these factors and the manager alpha of the industry, we perform a regression analysis seeking to find the best fit between returns of a hedge fund composite (HFRI Funds Weighted) and returns of statistically relevant and representative pre-identified market variables that include equity, government bonds or credit spread indices, but also specific risk premiums that hedge funds typically capture; such as the size premiums.

Assuming that hedge funds' exposure to these market variables can fluctuate in the short-term but is relatively stable over a long time period and using CIO's forward-looking capital market assumptions for each market variable, we derive an aggregated forward–looking, long-term expected return for hedge funds.

4.3. Volatility research

CIO volatility research focuses on thematic, tactical and strategic investments in volatility markets. It offers yield enhancement strategies, hedging strategies as well as volatility trading recommendations for clients.

4.3.1 Methods & processes

We use several approaches to evaluate the attractiveness of the volatility markets. These range from percentile calculations to Monte Carlo methods, value-at-risk, back-testing, Black-Scholes modelling and stochastic volatility models. We furthermore make frequent use of standard statistical methodologies.

4.3.2 Forecasts

CIO's volatility team forms views that have a time range from one month up to several years. The duration of the view is dependent on the type of strategy and the nature of the options under review. The information content of shorter dated options only applies to a short time range. Whereas, when investigating options with a long maturity, we use that information to formulate longer dated opinions. No explicit forecasts are published for expected future volatility, beyond those used in SAA calculations.

4.4. Thematic research

CIO analyzes the impact of medium- to long-term investment drivers like ageing, population growth, and urbanization as well as potentially disruptive forces such as technology, society, and resource constraints. on global financial markets, and offers specific longer-term investment recommendations based on these identified drivers – mainly targeted at private investors.

The basis for themes is often found in demographic, macroeconomic and scientific projections. For example, CIO has used demographic projections from the UN to discuss population growth and aging, as well as urbanization trends, and to issue a long-term investment theme series on identified topics that should ultimately benefit from these multi-year trends.

Numerous groups within CIO are involved in thematic research. Different functional and geographic groups are assigned a wide range of responsibilities, depending on the topic being covered. The work that these groups produce is then compiled to come up with the overall thematic research views.

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Version C/2024. CIO82652744