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J.P.Morgan

Global Quantitative and Derivatives Strategy
04 June 2018

2018 JPM US Macro Quantitative and Derivatives Conference

Summary of Conference Presentations and Client Survey

Our 16th Annual Macro Quantitative & Derivatives Conference (New York, May 18) was attended by ~600 investors representing 300 institutions. The conference featured presentations from Kepos Capital, Man AHL, Cantab, Blackrock, Acadian, PIMCO, Gresham Investment Management, Alliance Bernstein, Duality Group, AQR, SSGA, Invesco, Teacher Retirement System of Texas, Janus Henderson, ERAAM, and ARP. Speakers at the conference deliberated on various aspects of cross-asset risk premia strategies (vol targeting, CTAs, risk parity etc.) including their rationale, construction, position sizing, timing, risks, macro sensitivities, and expected future performance. Additionally, applications of big data, machine learning and AI to the investment process, to trading news, in complementing traditional factors, and to systematically predict regimes were also discussed. In this report, we have summarized the conference presentations highlighting the key insights in each talk. Our next Quant Conference will take place in London on October 19th.

We also conducted a survey asking our clients about the expected performance, risks, implementation choices, and other aspects of risk premia strategies along with likely impact of big/alternate data and machine learning on these strategies. Investors continue to see strong interest in quantitative investing. They expect quant portfolios to do the best in modestly up market, range bound yield and medium volatility environments. Investors perceive the greatest threat to quant strategies from political/geopolitical risks followed by market volatility shocks like the one experienced in early February this year. There remains widespread agreement among conference participants that big data and machine learning will continue to transform the investment landscape. They believe that big data/machine learning's greatest impact will be as a tool for enhancing portfolio/risk management, closely followed by its role in enhancing existing risk premia strategies and to a lesser extent in creating new risk premia products. The number of alternative data sources evaluated by conference attendees (and their immediate teams) remains low. More broadly, in terms of market expectations, ~50% of participants are cautious expecting S&P 500 to remain range bound 2600-2800, while a third are more bullish and see the market drifting up to 2800-3000 range by year end. At the macro level, recession is not seen as an imminent threat and is not expected to occur before 2020 by an overwhelming majority of investors. Details on the survey results are provided in Page 5.

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Global Quantitative & Derivatives Strategy

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Executive Summary

In recent years, investors have paid increasing attention to Alternate Risk Premia as a source of returns uncorrelated with conventional equity and bond risk premia. Moreover, low global policy rates has inflated the valuations of these traditional assets and depressed their implied premia to decade low levels, adding to the attractiveness of alternate risk premia. In addition, application of Big Data, Machine Learning and Artificial Intelligence to risk premia investing remains a contested topic. At J.P Morgan, we have published extensively on these topics, including detailed guides on Cross-Asset Systematic Strategies, Cross-Asset Momentum and Equity Risk Premia Strategies; a primer on Big Data and AI Strategies: Machine Learning and Alternative Data; and very recently US Factor Reference Book: Payoffs, Pitfalls and Analysis of 100+ Equity Factors.

Our 16th Annual Macro Quantitative & Derivatives Conference (New York, May 18) was organized around the theme of Alternate Risk Premia investing and how Big Data, Machine Learning and Artificial Intelligence will influence its evolution. The conference was attended by ~600 investors representing 300 institutions. The conference was moderated by Marko Kolanovic, Global Head of Macro Quantitative & Derivatives Strategy and Dubravko Lakos, Head of US Equity Strategy & Global Quantitative Research. The conference was introduced by Jason Sippel, Global Head of Equities.

Conference Presentations

Speakers at the conference deliberated on aspects of cross-asset risk premia strategies including their rationale, construction, position sizing, timing, pitfalls of data mining, factor-macro risks, and expected future performance. Additionally, applications of big data, machine learning and AI to the investment process, to trading news, in complementing traditional factors, and to systematically predict regimes were also considered. In this report, we have summarized the conference presentations highlighting the key insights in each talk.

- **Factor Investing and Market States Factor Investing and Market States**: The speaker identified six key market state variables that give sufficiently differentiated performance under various regimes for multi-asset/multifactor models: 1) Nominal risk free rate; 2) Monthly change in nominal risk free rate; 3) 10yr bond yields; 4) 10yr-1yr term spread; 5) Credit spreads; and 6) Shiller US CAPE. Best factors based on performance stability and diversifications in unfavorable states include: trend, stock momentum, nominal bonds, low beta & quality stocks, FX value, FX carry, and RV macro momentum. Worst factors include: hedge funds, commodities, small cap stocks. Factor distributions can be skewed, but with skew comes return.
- **Working Your Tail Off: The Impact of Volatility Targeting**: The talk focused on the use of volatility targeting (scaling) across 60+ assets and two multi-asset portfolios to improve risk management and reduce tail risk. The speaker argued that Volatility targeting can help to counter the fluctuations in volatility, improve Sharpe ratios and reduce tail risk at both the asset level and the multi-asset portfolio level. Volatility targeting results in a much smaller left tail (which is what most investors care about).
- **Trading the News: Moving Beyond Traditional Approaches**: Presenter discussed trading news using methods beyond traditional approaches. Standard sentiment analyzers (e.g. bags of words) can give some predictive edge. One improvement beyond standard analyzers is to use recurrent neural networks (RNNs) and long-short-term-memory (LSTM) to capture semantic and sequential structure. Improvements could still be hard to realize due to high turnover and trading costs in sentiment strategies.
- **Artificial Intelligence in Investing**: Speaker spoke about the impending transformation of the investment landscape and argued that artificial intelligence is not plug-and-play for investing. Skepticism is good as 90% of the claims on AI are false or redundant, but one should also be engaged as 10% of the claims are transformational to the industry. It is important for PMs to educate themselves on AI, so that they can understand and apply machine learning properly in their investment process.
- **Perceptions of Risk in Uncertain Times**: Presenter warned that investor irrationality/cognitive biases, and disincentives to prepare for uncertain/significant negative events may combine to create a "predictable surprise". Some other possibly

neglected current risks include: an inadvertent over-allocation to crash risk (e.g. high allocation to private markets and alternatives), unintended exposures in commoditized factor investing, and portfolio concentration.

- **Insights from Alternative Risk Premia in a World of Lower Expected Returns**: Speaker emphasized poor outlook for traditional beta, specifically equities and bonds. Quants should not ignore the macro landscape since there are always implicit macro risks in almost all quant strategies. On a more optimistic note, he described how in this world of lower expected returns alternative risk premia strategies offer a plausible solution with high Sharpe ratio provided we manage macro risks appropriately.
- **New Frontiers in CTA Strategies**: Showed that Alt Commodities can deliver superior Information Ratios to markets covered by liquid futures, but this isn't a 'free lunch.' Risks to this strategy include high as well as difficult-to-estimate transaction costs, difficult execution, operational intensity, limited liquidity, and opaque/limited data.
- **Defensive Outcomes from Alternatives**: Speaker asserted that alternative risk premia space is more than styles and includes structural benefits (supply/demand imbalances), cross asset benefits (interconnectivity of asset classes/signals) and hedge funds (e.g. trend and merger arbitrage). Practitioners should remain mindful of structural risk (embedded equity risk premia), point in time risk (point in time exposure to equity) and idiosyncratic risk (risk around an event e.g. Brexit).
- **Left Brain | Right Brain: Blending the Best of Both Worlds with Machine Learning**: The presenter argued that machine learning can be used to systematically detect time scales and predict regimes. One could combine machine learning with discretionary views and domain knowledge to improve forecasts. We have finally obtained the computational power to tackle the complexities in financial data with machine learning.
- **Craftsmanship Alpha**: The talk highlighted that style portfolio performance can vary significantly with variations in definition, construction and implementation. Each enhancement can potentially increase IR minutely and a cumulative impact may not be additive but can still be a significant edge. A well-crafted strategy is likely to have better performance in the long run.
- **Quality Assurance: Demystifying the Quality Factor in Equities and Bonds**: The presenter believes that investible strategies in fixed income remain challenged due to market microstructure (fragmented/complex/liquidity issues). Fixed income investments primarily rely on credit, liquidity and term premiums though their relevance vary based on the sector. Combining quality factors across equity/fixed income can mitigate some of the negative skew elements that exist individually.
- **Positioning of Factor Investing**: The talk gave a very broad overview of factor investing from a practitioner's perspective. He expects factor investing to become mainstream and part of every portfolio both for portfolio analysis and return generation. Research is critical. Speaker has adopted statistical machine learning as well as natural language in his investment process and sees this part of the evolution.
- **An Allocator's Perspective on Risk Premia Investing**: The speaker noted that asset allocators need solutions for long-term portfolio needs. Risk premia investing presents an important tool for addressing these needs. It is a challenge to identify, price, and execute risk premia strategies, but there is opportunity to leverage relationships. The high level of transparency of systematic investing is a plus.
- **Panel on Risk Premia Investing** moderated by Dubravko with3 Panelists presenting their views on various topics on risk premia investing. The Risk Premia space has proliferated really well in the last 5 years and is now a part of major institutional investors' portfolios. The skepticism has reduced and the strategies are now incorporated frequently though are still allocated a low share. New areas of developments are customization in risk premia to address specific needs, thereby building on uniqueness for each strategy and hence staying ahead of commoditization. Portfolio construction is a neglected area and has a high potential of influencing overall performance. Majority of the industry is still long only; there is a huge opportunity with implementation of more market neutral strategies.

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Survey Results

As is traditional during the conference, a survey on Alternative Risk Premia investing, Big Data and Machine Learning was conducted. Participation varied in the questions between 170-270 investors. The key findings are summarized below:

- Investors perceive greatest risk to the quantitative strategies come from political/geopolitical aspects (43%) followed by market volatility shocks (29%). Very few investors believe bear market (9%) or inflation (19%) is the major risk to quantitative strategies.
- They identify Value (38%) and Momentum (35%) to offer best opportunity as risk premium style over the next 1-3 years. Strategy wise, participants expect largest downside risk from selling option volatility (41%).
- Regarding Environmental, Social and Governance (ESG) investing, more investors are currently evaluating ESG strategies (29% now vs 18% a year ago). Fewer investors expressed no interest in ESG (44% now vs 54% a year ago).
- When asked about the use of volatility scaling/targeting, 29% of participants claimed no use. The two most popular measures of volatility used for vol scaling/targeting are 1-3M vol (23%) and 3-6M vol (17%).
- Investors expect their quant portfolio to do well in modestly up market, range bound yield and medium volatility:
  - In modestly up market (33%) vs range-bound or down market (20% each). Also, a majority (46%) of investors expect S&P 500 to be range-bound (2600-2800) by end of this year.
  - In range bound yields (32%) or falling yields (31%) vs. rising yields (18%). Additionally, two thirds of investors expect US 10yr yield to remain range bound (3.0% - 3.5%)
  - In medium volatility regime (43%) vs high or low volatility regimes (25% each)
- Next recession is anticipated in 2020 (44%) or after (31%) by the participants.
- Our survey found widespread agreement among investors on the topic of big data transforming the investment landscape. Remarkable, 73% of the investors call it an Evolution and expect its importance to gradually grow. Fewer investors call it a Revolution this year (14% now vs 23% a year ago) and more investors call it a Fad (13% now vs 6% a year ago)
- Investors view big data/machine learning as a tool to enhance portfolio/risk management (28% now vs 25% a year ago), enhance existing risk premia strategies (25% now vs 30% a year ago) and to create new risk premia products (remains at ~20%). Interestingly, 16% do not plan to use big data/machine learning extensively compared to just 8% a year ago.
- A year ago, investors were divided in their opinion on “at what trading frequency would machine learning would have the largest impact”. This year we saw a noteworthy agreement.
  - This year: 58% cited intraday, 16% cited daily/weekly trading, 5% cited monthly/quarterly and 21% expected significant impact across all trading horizons.
  - A year ago: 26% cited intraday, 31% cited daily/weekly trading, 15% cited monthly/quarterly and 28% expected significant impact across all trading horizons.
- The number of alternative data sources evaluated by conference attendees (and their immediate teams) remains low. 42% had analyzed between 1-3 new data sets, while 34% had analyzed none at all.

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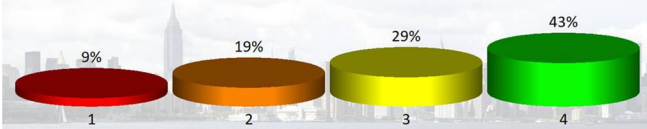
Attendees Survey Results

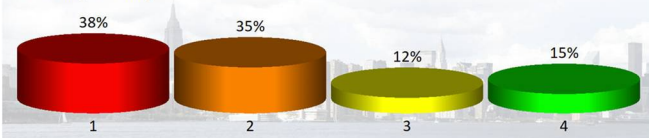
What do you perceive as the greatest risk to Quantitative Strategies you manage / invest in?

1. An equity bear market
2. A sharp rise in bond yields (e.g. inflation)
3. Market volatility shock
4. Political / Geopolitical Risks



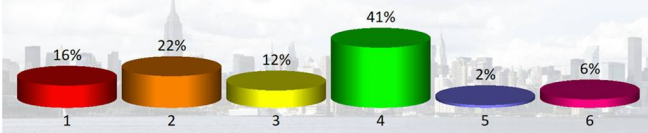
Which Risk Premium style will offer the best opportunity over the next 1–3 years?

1. Value
2. Momentum
3. Carry
4. Selling Volatility



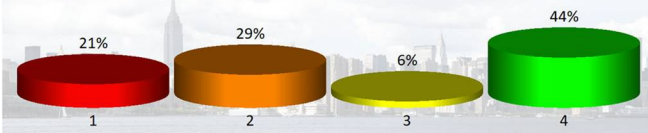
Which Risk Premium strategy do you think currently faces largest downside risk?

1. CTA (trend following)
2. Risk Parity
3. Low Volatility factors
4. Selling Option Volatility
5. Equity multi-factors
6. Stat Arb / High Frequency



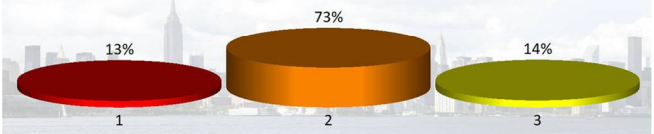
What is your view on Environmental, Social and Governance (ESG) investing?

1. We are already investing in ESG strategies
2. We are currently evaluating ESG strategies
3. We evaluated ESG strategies, but don't plan to invest
4. No interest in ESG



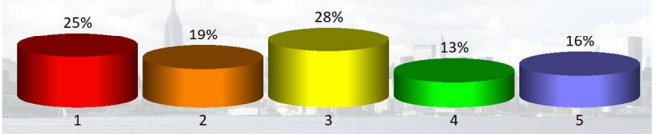
What is your opinion of Big Data / Machine Learning

1. Fad - investor interest will decline
2. Evolution - It's importance will gradually grow for all investors
3. Revolution - will lead to rapid changes to investment landscape



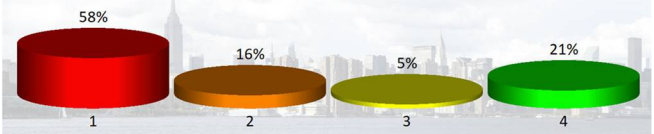
How do you plan to use Big Data / Machine Learning in investing?

1. To enhance existing risk premia / quant strategies
2. To build new risk premia / quant strategies
3. To enhance portfolio construction / risk management
4. To make discretionary calls / trades
5. Do not plan to use extensively



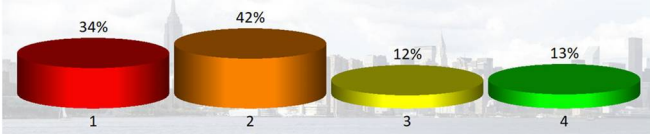
At what trading frequencies, do you expect Machine Learning to have the largest impact?

1. Intraday
2. Daily / Weekly
3. Monthly / Quarterly
4. Significant at all frequencies



How many new/alternative data sets have you (your immediate team) evaluated in the past year?

1. Zero
2. 1-3
3. 3-10
4. >10



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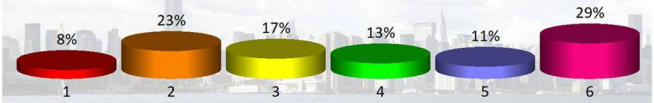
If you use volatility scaling / targeting, which volatility measure is closest to your methodology?

1. 1-month volatility or faster signals
2. 1 to 3-month volatility
3. 3 to 6-month volatility
4. 6 to 12-month volatility
5. 12-month volatility or slower signals
6. Do not use volatility scaling / targeting



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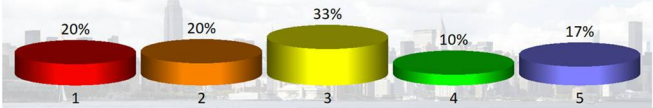
In which equity market environment do you expect the Quant portfolio you manage / invest in to do best?

1. Down market
2. Range bound market
3. Modestly up market
4. Strong up market
5. Doesn't matter, we are strictly market neutral



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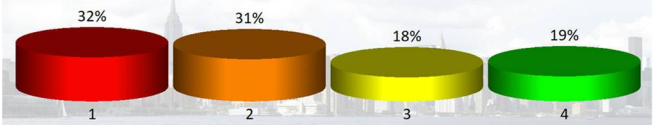
In which rate market environment do you expect the Quant portfolio you manage / invest in to do best?

1. Falling yields
2. Range bound yields
3. Rising yields
4. Doesn't matter, we are strictly duration neutral



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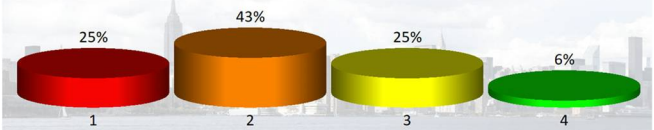
In which volatility environment do you expect the Quant portfolio you manage / invest in to do best?

1. Low volatility
2. Medium volatility
3. High volatility
4. Doesn't matter, we are strictly volatility neutral



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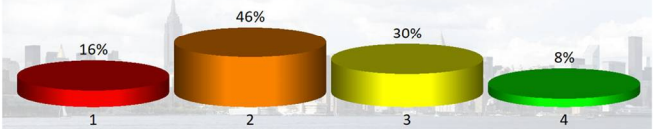
Where do you see the S&P 500 by the end of this year?

1. <2,600
2. 2,600 to 2,800
3. 2,800 to 3,000
4. >3,000



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Where do you see the US 10 Year Yield by the end of this year?

1. <2.5%
2. 2.5% to 3.0%
3. 3.0-3.5%
4. >3.5%

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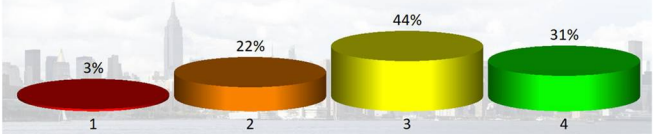
When do you expect the next recession?

1. This year
2. 2019
3. 2020
4. After 2020



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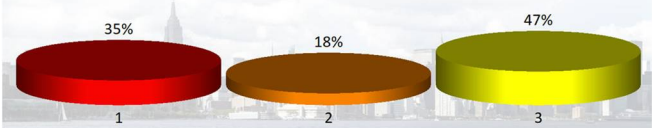
Which political party do you plan to vote for in November midterm elections?

1. Democratic
2. Republican
3. I am not a US citizen



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Factor Investing and Market States

Summary

- The talk was outlined around 3 topics within the umbrella of Factor Investing:
    - Factors and Market States
    - Allocation among Factors
    - Factor Returns Distribution and Low-Volatility Factors
- With the aim of building better policy portfolio, investors aim to construct diversified portfolios that thrive in various macro states specially the unfavorable macro states. The immediate questions are: What are the unfavorable states? What factors fare well or badly during those states? Growth and Inflation are the usually talked about as key states but the speaker argued about the need of analyzing a lot more state variables.
- The analysis presented was based on data going back as far as 1700s in few cases. He considered 17 market state variables and 27 Investible Factors (monthly returns). State variables were grouped into Quartiles (e.g. Top 25% growth, 2nd Quartile, 3rd Quartile and Bottom 25% growth) with the exception of recession indicator which was binary. Among the challenges faced was non-availability of dividend history and risk free rate for the full history. This was dealt with by analyzing only the difference in average returns (Top – Bottom) instead of absolute returns.
- A comparison of the performance of the US and UK equity and bond markets in various market states was presented. Economic growth rates are not very strongly correlated to asset returns in the US and UK. In the US, High Inflation is bad for equities (Top-Bottom returns T-Stat = -2.6) but not as much for bonds. In UK, Inflation does not influence equity or bond returns significantly (T-Stat insignificant). Inflation shocks are negative for equities and bonds in US. However in UK, inflation shocks are positive for stocks and negative for bonds.
- For a 60/40 bond/equity portfolio, high and rising rates and high equity valuations hurt portfolio performance. On the other hand, high credit spread and term spreads tend to help performance. High Volatility levels hurt the 60/40 portfolio performance. A measure of volatility after stripping out the equity correlation component is insignificant in deciphering portfolio performance.
- Results indicated that the 6 state variables matter the most out of the 17 analyzed. They are: 1). Nominal risk free rate, 2). Monthly change in nominal risk free rate, 3). 10yr bond yields, 4). 10yr-1yr term spread, 5). Credit spreads and 6). Shiller US CAPE.
- The unfavorable states oblige investors to look for factors that do well during those periods and for factors that help add diversification to the portfolio. The speaker presented a t-stat based scatter plot comparing performance confidence against diversification benefits of factors to identifying the ideal factor combinations to invest in during unfavorable states.
- Performance statistics of a 60/40 portfolio were compared with the same after replacing 25% of the equity exposure with the preferred factor combination from the above scatter plot filtering. The new method reduced the overall portfolio volatility from ~10% to ~7.5%. It also reduced the equity risk component from 90% to 72% and improved the Sharpe ratio from 0.71 to 1.03.
- He further demonstrated how reverse optimizing the portfolio with an assumed reasonable IR of 0.1 for all factors can benefit risk diversification. IR improved from 0.46 to 0.76. Most risk was associated with US equities followed by Value factor. This is in-line with expectations especially with the popularity in Value investing.
- In the last section of the talk, the speaker briefly discussed CFM working paper ‘Risk Premia: Asymmetric tail risk and excess returns’. The return series is ordered such that the absolute returns are increasing and then the cumulative performance is plotted. This gives a different visual representation of the skew in the return series.
- Value and Income tend to have positive skewness while Insurance and Momentum tend to have negative skewness.

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Conclusions

- Factor diversification should be done with the aim to diversify risk across market states. Growth and Inflation market states are not robust guides for assets returns. Equity market return is the most important state by an order of magnitude.
- Results indicate that the 6 state variables matters the most out of the 17 analyzed. They are: 1. Nominal risk free rate, 2. Monthly change in nominal risk free rate, 3. 10yr bond yields. 4. 10yr-1yr term spread, 5. Credit spreads and 6. Shiller US CAPE.
- Best factors based on performance stability and diversifications in the unfavorable states include: trend, stock momentum, nominal bonds, low beta & quality stocks, FX value, FX carry, and RV macro momentum. Worst factors include: hedge funds, commodities, small cap stocks.
- Factor distributions can be skewed, but with skew comes return. Short volatility factors have significant left tails. However, they aren't much worse than global equities and recover quickly. Value factors have a right tail often talked about as 'trash rallies'.

Q & A

- Q: You were asking why investors are overexposed to equities and do not invest more in other factors. Don't you think investors are skeptical about overfitting of factors using these states?
  A: Fair point. It is hard to over fit global equity strategy. It is much easier to do that with other strategies. However, the backtest of trend factor we did was fairly simplistic resulting in Sharpe ratio of 0.8. It was done over different time periods. While a realistic Sharpe may be lower it is certainly above 0.
- Q: Continuing with the question about why institutional investors do not diversify into factor strategies. There is about $20 trillion in funds among institutional investors. Is there enough capacity in these strategies outside equity?
  A: It is not equilibrium that everybody does factor strategy, so you are right in this sense. I am not arguing that every investor all over the world does this. The only global portfolio equilibrium all investors can hold is the market cap weighted one. What I am arguing is that sophisticated investors who could have made decisions about investing in factors in the past 20 years have surprisingly not done so.
- Q: A question was asked about the GDP growth mismatch with Equity performance in the analysis.
  A: The speaker elaborated about the quarterly nature of the series resulting in an imperfect overlap with return series.

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Working Your Tail Off: The Impact of Volatility Targeting

Summary

- The speaker focuses on the use of volatility targeting (scaling) across 60+ assets and two multi-asset portfolios to improve risk management and reduce tail risk.
- Volatility targeting can be done at the asset level to scale the positions by conditional volatility estimate, or at the portfolio level (which takes into account the time variation of cross-asset correlations).
- Volatility scaling helps to improve Sharpe ratios, but this is only for equities and credit (a.k.a. risk assets). On the other hand, the increase in Sharpe ratios is not significant for other asset classes such as fixed income, currencies and commodities.
- The above result may link to the leverage effect in risk assets, i.e. returns in risk assets tend to have a negative contemporaneous correlation with changes in volatility. As such, volatility scaling effectively exploits short-term momentum in risk assets, and such short-term strategies have historically performed well.
- Volatility targeting helps to reduce the probability of having extreme returns (on both left and right tail) across all asset classes, as measured by volatility of volatility and expected shortfall.

Conclusions

- Volatility is persistent and form clusters. Volatility targeting can help to counter the fluctuations in volatility.
- Volatility scaling is helpful to improve Sharpe ratios and reduce tail risk at both the asset level and the multi-asset portfolio level.
- Volatility targeting results in lower probability of having extremely negative returns, i.e. a much smaller left tail (which is what most investors care about).

Q & A

- Q: If central banks raise interest rates, then volatility will change. How much will you calibrate the volatility target?
  A: It's always a question how much you want your system to be fully systematic, or if you want to actively deviate from your system when some external events happen, e.g. the interest rate hike. You may try to use a lot of intraday data to pick up on big events when they happen and calibrate your target accordingly.
- Q: In the volatility targeting strategies, the right tail returns are also reduced. What is the distribution of the returns in the volatility targeting strategies?
  A: The question is, with the same Sharpe ratio, do you like even small returns over time, or lottery-like large returns? We actually emphasize on the left tail, as risk-adverse investors care much more about the left tail than the right tail.
- Q: You show that this strategy does not work as well for bonds, which may due to the regime change in the 1950s. Is it the same for the subsample post 1950s, and is there any reason other than the leverage effect you mentioned?
  A: The performance is actually from 1988 onwards, so it started when the new regime has started. Even that the Sharpe ratio has not been significantly improved. So this result is independent to the period 50 years ago where bond returns were less volatile.

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Trading the News: Moving Beyond Traditional Approaches

Summary

- News could move markets in a short-term horizon, but one should be careful about issues such as repeated news or fake news.
- From an event study on European stocks, we see that in general prices go up (down) for stocks with positive (negative) sentiment. However, some of the price moves happen before the news event, which could be due to data lag issues, information leakage, or the fact that some news articles are actually about the price moves.
- By regressing the residual returns on the sentiment scores, we see a positive relationship between returns and sentiment, but there has been some decay of this positive relationship over time.
- One way to improve the sentiment signal is to build a better analyzer to extract sentiment from text. Currently, sentiment analyzer uses short text extracts, which may overlook negations in the headline and incorrectly label a news article as positive (e.g. Sainsbury Acquisition of ASDA Not to be Completed).
- Traditional sentiment classifiers use a 'bag of words' embedding which counts the frequency of words, but they do not capture semantic or sequential structure. A possibly better approach is to use recurrent neural networks (RNNs) to classify sentiment, as RNNs can incorporate self-recurrent connections to model long term dependencies. Long-short-term-memory (LSTM) is a variation of RNNs which can be trained more efficiently due to its architecture to forget dated information that are no longer relevant.
- A three-level LSTM network improves the benchmark model (e.g. logistic regression) by a few percentages in terms of classification accuracies.

Conclusions

- Automated sentiment detection is difficult. Standard sentiment analyzers (e.g. bags of words) can give some predictive edge.
- One improvement beyond standard analyzers is to use recurrent neural networks (RNNs) and long-short-term-memory (LSTM) to capture semantic and sequential structure.
- Improvements could still be hard to realize due to high turnover and trading costs in sentiment strategies.

Q & A

- Q: How do you determine the true positive and true negative labels in the data set?
  A: You can either use the RavenPack classifications (or other standard sentiment analyzers), or you can test against subsequent market moves, i.e. if the market went up in minutes following an article, you may use that to classify the sentiment as positive.
- Q: Is it possible to condition the impact of the news on the current valuation of the stocks, or the number of news that have already been there?
  A: Yes. News sentiment signal is quite short-term with high turnover, so it is expensive to trade. Indeed, many people are trying to condition the news on different information to extract more edge from the news.

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Artificial Intelligence in Investing

Summary

- The speaker emphasizes that artificial intelligence is not plug and play for investing. One needs to be skeptical and discern the real claims in AI from the fake ones.
- Portfolio managers need to figure out what the machines are doing, i.e. what is the usual mechanism that the inputs translate into outputs.
- Academic literature suggests about a 2% signal-to-noise ratio in time series of returns, which is extremely noisy. Most machines are only able to find momentum, reversal or seasonality patterns.
- A large number of data samples is needed to train the model, since the common factors to machines are overwhelming. Even for two completely different objects (e.g. a Chihuahua dog and a blueberry muffin), the machine would think that they look very much the same.
- Non-stationarity occurs when the structure of the system generating the data changes, e.g. political changes and new markets. Every time there is a structural change, we are cutting the effective sample size for the training machine.
- Overfitting means that the model attempts to match idiosyncrasies of the training data and does not generalize well to unseen data. Common tools like cross-validation could be problematic in financial time series, as you may be fitting in-sample secular time trends rather than genuine cross-sectional relationships.
- One solution to avoid overfitting is to impose structures to your model, so that the coefficients are smooth over time and across similar terms. For example, adjacent lags in an autoregressive model are constrained to have similar coefficients.

Conclusions

- Artificial intelligence is not plug-and-play for investing. Skepticism is good as 90% of the claims on AI are false or redundant, but one should also be engaged as 10% of the claims are transformational to the industry.
- The industry is changing and it is important for portfolio managers to educate themselves on AI, so that they can understand and apply machine learning properly in their investment process.

Q & A

- Q: Among AI machines, quants and discretionary investors, how do you comment on their relative strengths and weaknesses in terms of predicting returns?
  A: I wouldn't make a distinction between AI and quants: AI's are simply tools to refine the process (it's like man plus machine). Quants have the advantage over discretionary investors by being able to take a broader bandwidth, i.e. by taking bets across different themes and in many different places. As such, even the skills in each bet is small, the overall profit can be substantial.
- Q: Have you seen any areas which are more promising to use new machine learning techniques?
  A: The things that machines are good at include text analysis, image classification (because of stationary data) and pattern recognition.

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Perceptions of Risk in Uncertain Times

Summary

- The speaker began noting the increase in sources of uncertainty in recent years: Brexit, US elections, French elections, North Korea, tax/healthcare policy, trade wars, etc.
- Despite the high uncertainty, 2017 realized volatility was below the 1st percentile among annual observations since 1929. The question is how we can reconcile this high uncertainty with the extraordinary market calm.
- Carney's trinity of uncertainties is: Policy, Geopolitical and Macroeconomic. We can quantify each of these sources of uncertainty:
- A news-based US economic policy uncertainty index (calculated based on the relative frequency of articles containing terms related to economic policy uncertainty in leading newspapers) shows elevated levels uncertainty in 2017 (never fell below its 60th percentile), and spiked near record highs following the US presidential election.
- Similarly, a geopolitical "threats" news-based uncertainty index was elevated throughout last year, and has steadily marched higher over the past few years.
- However, macroeconomic uncertainty measures (Chicago Fed National Activity index, dispersion of economists' 4Qtrs ahead US GDP forecasts) show low levels of uncertainty.
- The speaker thus notes the low macroeconomic uncertainty likely offset the rise in the other two sources of uncertainty caused the market to have diminished sensitivity to policy and geopolitical risks.
- Other possible rational explanation for the high uncertainty/low volatility conundrum: the stability of the economy makes policymakers less likely to 'rock the boat' due to increased political cost, a diminished signal/noise ratio in policy discussion (e.g. few investors read policy 'tweets' or react to highly partisan media interpretations), ambiguity in what is "uncertainty", the possibility that news-based indices are too simple a proxy.

Conclusions

- Investor irrationality/cognitive biases, and disincentives to prepare for uncertain/significant negative events combine to create a "predictable surprise" (i.e. disasters that should have been foreseeable/preventable but happened anyway) – for example, the 1987 crash, February 2018 volatility spike.
- We can no longer be confident that macroeconomic uncertainty will offset the other sources of uncertainty going forward.
- Some other possibly neglected current risks include: an inadvertent over-allocation to crash risk (e.g. due to high allocation to private markets and alternatives), unintended exposures in commoditized factor investing, and portfolio concentration.

Q & A

- When asked what could cause an increase in dispersion of economists' forecasts, the speaker flagged tightening liquidity conditions, dislocations in inflation expectations, or exogenous shocks as potential drivers.

Insights from Alternative Risk Premia in a World of Lower Expected Returns

Summary

- Quants should pay greater attention to Macro. Quant trades have implicit Macro risks (e.g. FI butterfly trade related to liquidity risk, commodity contango to stagflation risk etc.). Similar implicit risk argument applies to factor investing also.
- If we look at the beta of traditional asset classes, the outlook is quite pessimistic. Equity is very expensive (using CAPE, Div. Yield, Tobin-Q); bonds are also expensive relative to economic growth. Market price of risk too low. Meanwhile leverage across the globe is currently higher than 2007; Continuing QE is unsustainable in speaker's opinion.
- Three conundrums: (1) one can be right in the analysis and wrong in the facts. Bubbles can be sustained for a long time if probability of continuing bull market is high. (2) Luck vs. skill: Even if you are a great money manager, under realistic assumptions it may take 300 years for an investor to find that you are skilled with 90% confidence. (3) Protection is expensive: If hedging by buying a 1yr ATM forward put on the S&P 500, your expected return on the put is around -28%.
- Can style investing be the solution? Baz referred to a paper he jointly wrote with Granger, Campbell, Le Roux and Rattray (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2695101) that examines historical (1990-2015) relationship between Sharpe ratio and equity beta for three styles (Carry, Momentum, Value) applied to four liquid asset classes (Rates, FX, Commodities, Equities) in two types of strategies (time series and cross-sectional).
- The key results are: (a) 11 out of 12 styles in both strategies have positive Sharpe ratio, on average 0.2; (b) there is large diversification benefit from since the styles have negative correlation with equities (-0.25) and low correlation with each other (0.10); (c) the portfolio has a Sharpe ratio 1.4 before transaction cost (perhaps 1.2 after cost) with equity beta close to zero. Can we do better? Yes. If you isolate negative beta trades within these 24 trades, then you would not lose much alpha and gain higher Sharpe ratio.
- In sum, 1). Good quantitative strategies while necessary are not immune to Macro environment, 2). As much as we want believe that finance is a science like physics, we cannot ignore the feedback pervasive in financial strategies.

Conclusions

- Baz starts by emphasizing poor outlook for traditional beta specifically equities and bonds. Also, quants should not ignore the macro landscape since there are always implicit macro risks in almost all quant strategies.
- On a more optimistic note he describes how in this world of lower expected returns alternative risk premia strategies offer a plausible solution with high Sharpe ratio provided we manage macro risks appropriately.

Q & A

- Q: Are feedbacks and complexities you mentioned towards the end being brought into quantitative models? Is there some work you have done on that and have you found value in them?
  A: We are just at the beginning of that. It is astonishing how much mileage one can get from simple observations. For example, in a world where everyone is structurally short vol, it is not just about selling straddles or selling gamma or selling covered call on the back of an equity portfolio. There are so many implicit short vol trades. A risk parity portfolio is short vol since it is buying on weakness which could continue; momentum is often assumed to be long straddle but that is not quite true, one is actually playing on the volatility curve – you long long-vol and short short-vol. If you are buying the dip, that is also a short vol trade. The point is that you have to realize these are short vol trades before you can act on it.
- Q: If selling gamma or short vol strategies are to be avoided, what would put in that category of negative equity correlation strategies with positive returns?
  A: If you proper value, carry and momentum models they can tell you a lot. For example, if a commodity is very expensive on value basis and in contango, then value and carry are against you. If momentum is negative that is even better – you have negative expected return and are positive the market. If you short this trade you get positive return and are negatively correlated with the market. Similarly FX has many such trades. Kiwi today, for example, is highly correlated with the

business cycle and is very expensive on PPP basis. It has zero or even negative carry against the dollar. So if you are short Kiwi then you have positive expected return and negative equity beta. There are many more such examples.

- Q: A few years ago, in this conference, AQR gave a similar talk in which they argued that US factor strategies should be considered a new asset class and in itself a beta strategy. Do you agree? If you do, what is the implication of that?
  A: I agree that if we are all trading a specific alpha it become beta. Where I disagree with them is that there are still ways to time such strategies. For example, if there are liquidity black holes like the case in early February this year – then the way you trade Value is as mean reversion since as Value becomes cheaper the mean reversion is stronger.

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New Frontiers in CTA Strategies

Summary

- The speaker noted investors can take risk along 3 dimensions – models, markets and data – and in each dimension there is a trade-off between the potential alpha and the likelihood of success.
- 'Alt Markets CTAs' take markets risk, but limit model risks by applying well-known/documented trend-following techniques to alternative markets.
- These alternative markets are characterized by low liquidity, OTC/difficult execution, and opaque/limited data.
- Attempt to diversify either by trading different 'stuff' or the same stuff in different locations (where the underlying isn't fungible between locations, e.g. regional power grids since there is no way to transmit electrons between the separate grids).
- These markets are generally less populated by speculators, resulting in lower competition for alpha. Indeed, they attempt to inhabit markets where most counterparties are trading with different objective functions than profit maximization, allowing speculators to capture alpha in exchange for providing liquidity. One way to proxy this is to look at volume/OI ratios (low volume/OI = activity is mainly hedging rather than speculation). Also look for positive carry assets (e.g. due to binding storage constraints).
- To backtest strategies on these assets:
  - Need robust estimation techniques that account for shrinkage and correctly infer market structure (example given: coking coal historical prices should be reconstructed by looking at iron ore/hot rolled coil/rebar markets since it's used in the process of making steel, not thermal coal which has completely different usage and is nearly uncorrelated).
  - Need a bespoke transaction cost model to incorporate the correct trading dynamics of these markets.

Conclusions

- Alt Commodities can deliver superior Information Ratios to markets covered by liquid futures.
- But this isn't a 'free lunch;' risks to this strategy include high/difficult to estimate transaction costs, difficult execution, operational intensity, limited liquidity, and opaque/limited data.

Q & A

- Q: What factors go into bespoke transaction cost model?
  A: It is similar to a standard model, but you need canvas brokers and speak to utilities that trade it, to find out what t-costs look like in the real world.
- Q: How many separate accounts do you need to trade these markets and do you need physical storage facilities?
  A: Can count the number of clearing accounts on one hand, but need a larger number of counterparties. No need for physical storage.
- When asked about capacity/crowding risk, the speaker noted it's difficult to gauge where the tipping point is, but the compression of alpha due to entry of new large players in this space is a real risk.

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Defensive Outcomes from Alternatives

Summary

- Alternative investments are increasingly in-focus given the late stages of the business cycle, existing illiquid investments correspond to the business cycle and interest rates are pressuring equity/bond correlations.
- Investors are seeking additional diversification and bonds have historically been the defensive alternative asset (positive carry) when equities are under stress especially in the context of the traditional 60-40 portfolio.
- However, when both bonds and equities drop, investors usually turn to hedge funds as an alternative investment.
- Hedge funds struggle to be a strong alternative investment because 1) their strategies are directional and fail the diversification objective; 2) usually charge a higher fee per unit of vol; 3) while strategies are dynamic in nature, at a given point in time, they're unpredictable.
- A defensive oriented outcome would mean absolute returns over the investment cycle with low correlation to equities/bonds, negative convexity and increased correlation during periods of equity stress (not tail protection), transparency in portfolio construction and diverse source of return and implementation across a broad range of liquid underlying markets.

Conclusions

- The alternative risk premia space is more than styles and includes structural (benefit from supply/demand imbalances), cross asset (benefit from interconnectivity of asset classes and corresponding signals) and hedge funds (e.g. trend and merger arbitrage).
- Not all risk premia are create equal and practitioners should remain mindful of structural risk (equity risk premia embedded in alternative risk premia), point in time risk (strategies uncorrelated to equities in the long-run but may have point in time exposure) and idiosyncratic risk (macro country specific risk around an event e.g. Brexit).

Q & A

- When it comes to managing per unit of risk, an example would be diversifying across 30 deals for merger arb; If at a later point, you have 80 deals you can work with, you can keep the per unit of risk the same and lever to 2.5x to have a higher expected return.

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Left Brain | Right Brain: Blending the Best of Both Worlds with Machine Learning

Summary

- Machine learning is like the industrial revolution of asset management.
- Machine learning is evolutionary, contemporary and skeptical, and is driven by data rather than observatory biases.
- Machine learning is adaptive and prospective. It learns about the time scale in which we remember and forget things, and that is the key to make systematic trading more adaptive and less vulnerable.
- Portfolio optimizers can now deal with a lot of complexities, and computationally we have reached a point where Artificial Intelligence knows when to stay out of the game after interesting performance or erratic distributions of returns.
- Adapting Machine learning to finance has struggled to reach the same success as in image recognition. Machine learning is not able to merge the left and the right brain in an architecture that is made to make money.

Conclusions

- Machine learning can be used to systematically detect time scales and predict regimes. One could combine machine learning with discretionary views and domain knowledge to improve forecasts.
- We have finally obtained the computational power to tackle the complexities in financial data with machine learning.

Q & A

- Q: How do you find the time scale? A: With Machine learning you can actually learn the time scale and this is the key to make systematic trading adaptive, and to get the best of both worlds (systematic and discretionary) if you have any perspectives. For instance, if one detects a regime shift, one could shorten the time scale.
- Q: Are you using Machine learning more on the systematic side or the discretionary side? A: Machine learning is purely systematic. It's not man in a machine. It's a machine that is evolving to have some good things that human have.
- Q: Can you give us some insights or examples that you like or don't like, e.g. data frequencies, asset classes, models like SVM or neural nets? A: I don't like deep learning, as financial data has low signal-to-noise ratio and after a couple of layers, the neural network has nothing left. Regarding time scale, it is trickier that it is evolutionary in nature, but there is a basic assumption that the market changes all the time.

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Craftsmanship Alpha

Summary

- Speaker introduced the 'craftsmanship' as the methodical approach to systematically translate economic theory into investable portfolio to successfully tap into the alpha. The process discussed is also available as a published research.
- The craftsmanship was defined to have 3 essential elements: 1) Defining the Factor/Style, 2) Constructing the Portfolio and 3) Implementing the Portfolio. Although the topics are highly debatable without any one standardized way defined as the most accurate, it is of high importance to consciously evaluate each step.
- The traditional approach in defining factors involves simplistic HML method of Fama-French which focuses on book yield. Although there is no theory behind this definition and alternative approaches can help improving the IR.
- Alternative approach in defining may include altering book yield with lagged price or it may also involve incorporating other yield measures into the definition of Value. The various alternate definitions may not outperform each period but can be an improvement in long term returns.
- In portfolio construction, a standard approach involves tercile based long and short portfolios that are market capitalization weighted. The construction has its own tradeoffs.
- While constructing portfolio, more extreme narrower portfolio can be built using quartiles, quintiles or even deciles. The weighting can also be experimented with e.g. equal weighted, rank based, signal weighted and so on. Each of these variations has their pros and cons. Speaker demonstrated a particular example of US Value factor performance where enhancement in IR can be attributed to signal weighting.
- Another simplistic approach in portfolio construction is to not controlling for market exposure or sector/industries exposures. These unintended risks may reduce the overall performance of the factors. Normalizing for market and sector exposure can help enhance the performance of the strategy.
- Portfolio implementation was discussed with emphasis on rebalancing frequency. Increasing rebalancing frequency does help in terms of using a fresh signal with a lesser alpha decay but it comes at a higher cost with increased turnover.
- An optimal rebalancing frequency can be identified for individual factor which can be different from that of other factors.

Conclusions

- Style portfolio performance can vary significantly with any of the variations in definition, construction and implementation.
- Each enhancement can potential increase IR by only 0.1 and a cumulative impact may not be additive but can still be a significant edge.
- A well-crafted strategy may not outperform the plain vanilla strategy in each period, but it is likely to have better performance on longer runs.

Questions and Answers

- When asked about the possibility of several optimizations ability to invert the metric, the speaker addressed it to be a highly unlikely. Further she elaborated on the importance of individual sensitivities to be studied separately.
- A question was asked about the overall IR benefit using the craftsman techniques. Speaker responded that it can vary based on choices and the analyses based on various choices are available in the paper.
- When asked about factor timing based on business cycle, the speakers briefly discussed about the importance analyzing the correlation matrix and then orthogonalizing the factors to eventually netting out the factor exposure.

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Quality Assurance: Demystifying the Quality Factor in Equities and Bonds

Summary

- Smart Beta has attributes of active (expectation of benchmark outperformance, potential for volatile short term performance) and passive (low cost, transparency, consistent implementation) investments.
- Traditional equity factors (value, size, vol, quality, momentum) help capture credit risk (value, size) and liquidity risk (vol, quality, momentum).
- Yield slope captures premia from the relative outperformance of longer maturity bonds relative to shorter maturity bonds (term premium).
- Quality for fixed income is usually defined by ratings (higher default risk) but primarily the mispricing of default risk which tends to be bond-specific.
- Default risk can be measured by the KMV model which maps the theoretical distance to default to an expected default frequency based on a larger database of actual global financial defaults.
- When the EDF (expected default frequency) is combined with the fundamentals of the firm (bond size/term), a fair value spread can be created as an input for constructing a Quality factor.

Conclusions

- Academic evidence aside, investible strategies in fixed income remain challenged due to market microstructure (fragmented/complex/liquidity issues) which results in factors producing premia in investment grade being less capable of producing premia in UST markets.
- Fixed income investments primarily rely on credit, liquidity and term premiums though their relevance vary based the sector.
- A 60/40 allocation to the quality cross-asset-class mix offers a statistically significant return with lower tail risk (higher potential diversification benefits) compared to traditional cap-weighted allocations and combining quality factors across equity/fixed income can mitigate some of the negative skew elements that exist individually.

Q & A

- When building out the Quality factor of fixed income, be mindful of considering default priority (senior vs. junior bonds).
- Liquidity Cost Scores (LCS) should be incorporated into factor building to account for transaction costs when calculating expected returns.

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Positioning of Factor Investing

Summary

- Factor investing is one of the growth engines for speaker's firm and the talk focuses on practitioners' perspective on factor investing. Factor investing is: (1) a permanent advancement in how assets are managed; (2) distinct and differentiated from traditional active and pure passive with the ability to explain risk and return, allowing for greater granularity and customization; and (3) requires its own expertise that is supported by decades of empirical research.
- Factors have two broad uses: portfolio analysis and investment strategies. Portfolio Analysis: (a) Helps explain risk/return characteristics; (b) Can help manage many factors that exhibit predictable return patterns throughout the economic cycle; and (c) Can highlight unintended factor exposures. Factor Investing Strategies: (a) Some factors tied to a systematic rationale, establishing an expected return premium; (b) Other factors useful in pursuing investment objectives (i.e. reduced volatility, ESG); (c) Factors can also be designed as a standalone or as a complement to non-factor strategies.
- Client needs differ and managers can tailor factors accordingly to generate alpha, lower cost and achieve diversification. We still need managers who can generate pure alpha or idiosyncratic returns but they have to prove that they are skilled at it.
- Machine learning, new datasets and methodologies offer endless opportunities and will change how investor behave and will subsequently influence markets landscapes profoundly in the future. However, often the dataset is too short and what machines can learn is limited because they cannot think. Signal to noise ratio is generally very low. Often finding correlations does not imply causation. Humans have to interpret the information.
- Factors should have rationale and can (1) Be risk premiums which is expected return for bearing additional risk e.g. an undesirable return pattern; (2) Have behavioral rationales where biases of participants cause distortions; or (3) Be due to market structure like regulation, market frictions or policies which are limitations for some and are opportunities for others.
- It matters how factors are combined – to combine them we need to understand their relationship with each other. Speaker shows how in a multifactor framework, Quality and Momentum (taken as first two principal components) can be used to explain a wide variety of factors. It is interesting how Value factors cluster together suggesting they have similar underlying exposure to Quality and Momentum – all Value factors have negative relationship with Momentum but factors like Cash Flow Yield and Dividend Yield have positive exposure to Quality while Book Yield has negative exposure to Quality. This type of analysis provides a hierarchical approach to factor combination.
- Speaker sees multi-asset multi-factor as a growth area. It is less crowded than the equity space. It is important to have specialist teams providing the factor inputs. Baseline solution is Diversified Risk Parity that maximizes diversification in line with the intuition that 'a portfolio is well-diversified if it is not heavily exposed to individual shocks'. Advanced solutions include factor-based tail-hedging, factor completion or a fully diversified multi-asset multi-factor proposition.
- Among the Machine Learning methods, the speaker is most actively using Natural Language Processing. He is not too convinced about the benefit of 10-K / 10-Q filings since they lack spontaneity and may not add much more to numerical information. Earnings Conference Calls may be more informative especially the Q&A section of these documents since it is less scripted and therefore particularly suitable to the identification of hidden cues in textual data.
- Machine Learning tools are also used to find non-linear relationships in multi-factor model. The increase in factors to potentially consider and the advance in technology make this both viable and attractive. The key test is whether out of sample forecast and performance of non-linear forecasts add any incremental value to existing linear multi-factor model.

Conclusions

- The speaker gave a very broad overview of factor investing from a practitioner's perspective. He expects factor investing to become mainstream and part of every portfolio both for portfolio analysis and return generation.
- Research is critical. Speaker has adopted statistical machine learning as well as natural language in his investment process and sees this part of the evolution.

Q & A

- Q: Can you share with us any machine learning based factor you have constructed?
  A: We have processed factors through machine learning algorithm and forecast based on a combination of LASSO (OLS post LASSO), random forest, and Artificial Neural Network.
- Q: One of the survey questions earlier in the day was about machine learning as an add-on strategy or as a separate strategy. What is your view on that?
  A: It is hard for me to separate out the two approaches. Yes, one has generic factors and complicated factors, sometimes from 20 to 100 factors for a given problem. The question is how you use machine learning algorithms to process them. Different problems and datasets have different algorithms – if you find the right one, you learn something new. The interesting thing is whether the outcome is different from traditional approach. In which market regime is it different? It is a learning process.
- Q: Processing and cleaning big data seems to take 80% of the effort in using some of the new datasets. How do you process and clean data?
  A: This is a totally new housekeeping process - cleaning the data, smoothing, removing outliers etc. This has to be done no matter what technique or machine language method is used.
- Q: You mentioned non-linear multifactor approach in constructing the portfolio using machine learning. The other way is to stick with linear multi-factor model but use machine learning to time factors and create non-linearity. Can you comment on which is better and less subject to overfitting?
  A: Again there are so many choices in the application, algorithms, techniques, most of them open source, one can use. It all depends on the dataset and the problem. I cannot claim we have researched everything. In the talk I have given some teasers.
- Q: Stepping back from machine learning related research, how much time do you spending at in deciding why something is a viable factor?
  A: From a research perspective we spending about 20-25% of the time on machine learning, On factors side finding a new factor that provides incremental improvement is very difficult and happens slowly. Portfolio construction and implementation seems to be more important. Macro factors are used mostly for analytic purpose.

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An Allocator's Perspective on Risk Premia Investing

Summary

- The speaker addressed the risk premia investing from the perspective of an allocator looking for alternate returns sources.
- Allocators are facing difficult choices in this world of low returns. They could: (1) Stay the Course – traditional market risk premiums are the lowest cost and highest capacity; (2) Take more Risk – this would be taking greater concentration, liquidity (private market, hedge market) and leverage risk; (3) Add Alpha; and (4) Diversify More Across 'Known" Assets - go into frontier markets, replace equity risk with levered duration risk etc. In other words, not more risk but smarter risk. This where risk premia investing lies.
- Finding good risk premia factors can be challenging. There is no traditional roadmap to alternative risk premia like there is for standard asset classes. Instead, the firm created its own framework. The two most fertile areas have been academic and industry research for most of the theory, and Hedge Funds and active managers for much of the practice. Investors can leveraging their competitive advantage as an allocator by (a) utilizing extensive network of partners as a "force multiplier"; (b) finding unique insight into practices of top asset managers and banks; and (c) using "Open source" nature of risk premia research and implementation that lends itself well to transparency and collaboration. Some key characteristics to look out for are evidence both in- and, more importantly, out-of-sample performance; economic motivation; and Persistent, Pervasive, Robust factors.
- Advantages of using systematic investing: It has fully transparent and explainable systematic processes. The investor can know the signals; know the mechanism and understand the risks – a fully systematic process can be aggressively stress tested. We can institutionalize some of these ideas and reduce the temptation to over-react to near-term performance (difficult in practice).
- Allocators cannot replace traditional asset allocation aggressively with risk premia alternatives because the kind of leverage needed to replace equity risk with long-short strategies would be excessive. However, one can be effective in two ways. (1) Have total trust overlay with derivatives-based allocation without a capital allocation; and (2) factor allocation targets within global equity book. This would tilt global equity allocation with "factor tailwinds" and use factor-focused equity strategies to provide more concentrated exposure. Once we've identified the desired factors, portfolio strategy ensures that compensated risk premiums have targeted exposures and use active management where alpha in excess of risk premiums can be generated.
- This is simple in theory but not easy. In a $75bn equity portfolio generating 50bps of factor returns using long-short strategies requires gross leverage and a lot of exposure to pure factor portfolios. Many of the fundamental managers show persistent tilts but in addition these pure factor portfolios will be one of the fastest growing investments as active manager replacement.

Conclusions

- Allocators need solutions for long-term portfolio needs. Risk Premia Investing presents an important tool for addressing these needs.
- It is a challenge to identify, price, and execute, but there is opportunity to leverage relationships and the high level of transparency of systematic investing is a plus.

Q & A

- Q: You showed a collection of factors that did not have much statistical power on their own but when you combined them you got a much better performance. What does that tell you?
  A: The statistical power of the combined signal is not much better – the information coefficient is still low but diversification has smoothed out some of the peaks and valleys and has given a much better return profile.
- Q: As a pension fund how are you taking the risk premia allocation to line it up against your liabilities on economic basis?
  A: At this point all we can do is replacing active risk. There are certain classes of assets where we think we can do things more effectively by tilting towards certain factors. The power of these strategies is in their scalability but with a plan of our

size there are limitations as to what we can do replacing equity and bond risks. We see these factors as an opportunity to take a bit more of active risk and that is what we are doing.

- Q: Do you see internal risk premia investing as a general trend among pension funds?
  A: It has been a bit easier for us because of our trading experience in cash equities and derivatives before we started going down this path. We have talked to some of our peers who are looking at the path to replacement of active managers using internally managed risk premia products. They face barriers in bringing operational capabilities internally. We don't have a bias against using external index products but since the margins are very thin, if we can save some on transaction costs we want to do that internally.
- Q: You mentioned you have partnership program and that you can leverage your role as allocator to get the IP. Can you elaborate on how that works?
  A: We have four strategic partners that work on our behalf and share knowledge with us. In fact, the run like mini pension funds within our pension fund. We also have access to banks like J.P. Morgan so we also get academic and industry research from them. Risk premia is fairly unique in that there is no strong intellectual property right issue. So we are able to see what is happening in the industry including hedge funds that are willing to share some of these concepts.
- Q: When you partner with industry providers how do you do due diligence? Do you have a framework in evaluating and risk-budgeting their models?
  A: Currently we are doing almost all modeling internally. So most of our external communication is to do due diligence on our own models. That is a challenge. To take the example of a commodity signal I built. Once I had the model I looked at how it was done in the industry and then the risk is that I could go back and try to tweak the parameters in my model. The discipline we impose is about how to think about this as risk premia alpha and also apply good portfolio construction techniques.
- Q: I will ask a question to myself. How do I think about factor timing?
  A: That is one area we are different from mainstream. We are anti-factor timing. We explicitly avoid trying to time factors. If we three factors for example and factors 2 and 3 are offsetting, we would increase the weight on factors 2 and 3 to boost them and get the maximum diversification. That is a little different from what others do.

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Panel on Risk Premia Investing

We hosted a panel of risk premia investors moderated by J. P. Morgan's Dubravko Lakos. Dubravko moderated the discussion around the following areas:

- The investment philosophy of the firm
- Thoughts on the biggest value add by Quants on Risk Premia
- Significant Growth in the space with huge inflows into the space, increasing attendance in the quant conference. Risk Premia cycle is probably now in a maturing stage. What are the expectations from this investment style going forward and how to stay ahead of the curve?
- Commoditization of the risk premia strategies are making them more passive equivalent. Thoughts on impact from this?
- Which area of factor investing do you see practitioners devote more attention to and which areas are most neglected?
- Risks from the recent shifts in the macro environment?

Summary: Panelist-1

- Investment philosophy: The speaker's firm runs 40 active mutual funds and multitude of customized products. On quantitative and systematic side, they focus mainly on strategies that are well documented utilizing more of practitioners approach that the academic approach.
- Biggest Value add by Quants: Diversification is the primary benefit and further exploration of what the risk premia can do when mixed with the original portfolio is great values add.
- Evolution in the space: 5 years ago when they launched the fund the talks were around the real world implementations of the techniques and what the return expectations. As we moved to this year the discussion was more implicit about precision in implementations and what the correlations are; if we can implement as standalone with Sharpe Ratio of 0.7 – 1.0. The discussions are more around the fact that they are liquid and scalable for clients. Conversations have moved from real world implementation to real world expectation and evolution.
- Staying ahead of the curve: To stay ahead of the curve there is a need to understand the precise demand and being able to customize, increasingly more so in last 5 years. Edge from low correlation isn't enough. Demand has now evolved to require more customized products.
- Commoditization in the space: Flexibility is the biggest challenge for commoditization as there is no standard method of getting risk premia exposure. Transparency is of high value, so that client understands what they have and how they can leverage it by implementing in their portfolio and seek to maintain their objective. Too much detailing loses the focus on the benefits.
- Practitioner's attention: Lot of time is being spent on specifying the factors in the portfolio. More time needs to be spent on relating the portfolio performance with the macro backdrop. This would help investors to better understand how the premia is behaving in different conditions and they are better positioned to employ these strategies in their portfolios in the given environment. More study needs to be done on the impacts from increased passive investing and the QEs this cycle.

Summary: Panelist-2

- Investment philosophy: More style investors and less/ no focus on idiosyncratic part
- Biggest Value add by Quants: He demonstrated using a chart that risk premia portfolios do not continue to underperform for a longer spell of periods and this is the biggest edge that they have.
- Evolution in the space: Risk premia industry had been disappointing lately as the performance has not been that good. This underperformance is raising questions if it is too late to joining the party. This may gradually start impacting the flows in the space. Highlighting from previous talks, Invesco presented active share of smart beta / factor strategies vs asset is

increasing. Growth in passive can also be a reason. PIMCO presented that proving an active managers worth (3% annual returns) statistically would need more that his lifetime (300 years). These two points provide a huge edge to the space.

- Staying ahead of the curve: Over time there had been erosion in the space but we deal with that by adding more risk premia strategies and different asset classes.
- Practitioner's attention: Cyril believes short side has lot of untapped value that is yet to get full traction by the practitioners. There is increased attention on factor timing and it is the Holy Grail. Cross-asset multi risk premia diversification is very already high, so the factor timing has an extremely challenging competitor. On the other hand, Portfolio construction is bit neglected. Increases in correlations with volatility has resulted in lots of drawdowns in the market, this is a result of the lack of attention to portfolio construction. Over relying on simplistic portfolio construction, short term correlation, ex-ante risk targeting have resulted in short volatility and short correlation. More work can be done on factor assembling and portfolio construction.

Summary: Panelist-3

- Investment philosophy: Panelist's investment boutique firm focused only on Risk Premia. They employ scientific data driven investment methods for extracting alpha and the products are truly alternative and market neutral Long Short in nature. They also offer products that are trend following like CTAs, Equity Event, and Multi-Strategy combinations. They trade globally in liquid futures in single name equities.
- Biggest Value add by Quants: Better diversification, much favorable liquidity and greater transparency. They deliberately aim to outperform Hedge Funds and believe that the risk premia by structure is capable of doing that on a regular basis.
- Evolution in the space: Our view is nothing much has happened yet. If we look at the bigger trends, Index and passive funds came around 50 years ago. Now it is obvious that it is a good thing to do. It took a really long time for them to dominate the mainstream. Allocation to Risk Premia strategies is still at very nascent stages in the Institutional Investor portfolios. Larger institutions have been the earlier adopters but still have marginal allocations. Consultants are beginning to become more active and thereby resulting in adoption by smaller institutional investors.
- Staying ahead of the curve: We expect the evolved state of investing to have a core passive with a layer of risk premia to diversify and harness alternate beta followed by some specialized stock selection methodologies focusing on idiosyncratic. Larger institutions have come to a realization that a larger pool of active manager pools to result into an overall market, although single manager can beat others but a collective diversification is pointless. Size of risk premia has increased vs the size of active managers within the institutional investor space. Risk model, portfolio construction and execution are the key elements to stay ahead of the curve.
- Commoditization in the space: We believe the names are being used widely, but the products will never be generic. They are active products and much similar to active managers in operations. They products used sounds similar but they are completely different and customizable. As an analogy, return dispersion across risk premia is very similar to return dispersion across hedge funds. And we have each hedge fund highlighting their uniqueness.
- Practitioner's attention: Bulk of the attention is on long only of the factor portfolios. There is vastly more potential by shifting that allocation to alternative and market neutral definitions of the risk premia. The main reason being the higher fees of these strategies. Long only side has lower fees.
- Risk from changing Macro: If one fears rising rates/inflation/volatility, they should reconsider their longs and long only positions and the longer duration like real estate and infrastructure. We build strategies that are lower duration and avoid being short volatility or correlation

Conclusions

- The Risk Premia space has proliferated really well in last 5 years and is now a part of major institutional investors' portfolios. The skepticism has reduced and the strategies are now incorporated frequently though allocated very low share.
- New areas of developments are customization in risk premia to address specific needs and there by building on uniqueness for each strategy and hence staying ahead of commoditization.
- Portfolio construction is a neglected and has high potential of influencing overall performance. Majority of the industry is still long only; there is huge opportunity with implementation of more market neutral strategies.

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