Pioneering the frontiers of factor investing

By Harald Lohre and Amar Soebhag

In mid-September, Lancaster University Management School joined forces with Robeco and Invesco to host the third edition of the Frontiers of Factor Investing Conference in Lancaster. During this conference, academics and practitioners immersed into almost every aspect of factor investing, ranging from classical asset pricing, risk management, machine learning to climate finance. In total, 60 recent academic papers were presented in contributed or poster sessions, all framed by five keynote speeches.

Harald Lohre (left) and Amar Soebhag (right)

Finance, Climate Change, and Artificial Intelligence

The conference kicked-off with an inspiring talk of Markus Leippold, Professor of Finance at the University of Zurich and Visiting Researcher at Google, providing a broad perspective on the emerging use-cases of NLP in climate finance and beyond. Prof. Leippold started his speech noting that academia can profit from understanding current societal needs, with climate change being an important example. His research agenda thus looks into the field of Climate Change and Artificial Intelligence (AI), with a special focus on Natural Language Processing (NLP). One powerful application is the use of BERT, an AI-based algorithm developed by Google for textual analysis. Specifically, Leippold and his collaborators thus quantified regulatory climate risk disclosures and analysed their impact on the term structure in the credit default swap (CDS) market.[1] Training BERT to differentiate between transition and physical climate risks, disclosing transition risks increases CDS spreads after the Paris Climate Agreement of 2015, while disclosing physical risks decreases CDS spreads.

NLP can also be utilized to detect misinformation. Through various NLP methodologies researchers can generate fact checking summaries for web claims.[2] For example, consider the following unverified claim on the Web: "Smoking may protect against COVID-19". In this case NLP may assist the user in establishing the correctness of claims by automatically generating explainable summaries for fact checking. Lastly, Leippold elaborated on pre-training BERT on thousands of human-labelled sentences with climate risk content from company reports[3]. This ClimateBERT is able to detect, extract and classify climate-related disclosures in company filings, which can be used to detect greenwashing. Such advancements are key for investment managers to support their effective engagement with identified company targets regarding their efforts towards mitigating climate change.

Panel Trees, Uncommon Factors and Bayesian Asset Clusters

Advances in AI and machine learning (ML) are also strongly shaping the profession's thinking about classical asset pricing: In this regard, Lin Cong from Cornell University made the case for considering ML techniques to investigate the relevance of asset cluster-specific factor models to explain the cross-

section of equity returns. During his keynote, he discussed his latest work on “Uncommon Factors for Bayesian Asset Clusters”.[4] Standard model selection methods typically assume homogeneous data observations which follow one common factor model. However, Cong asserts that asset returns exhibit grouped heterogeneity and a ``one-size-fits-all'' model has been elusive empirically.

Prof Cong’s work introduces a novel approach for jointly considering observation clustering and heterogeneous model selection, enabling homogeneous observations to follow one common factor model. In addition, the approach allows for observation clustering of stock returns, whereby the cross-section is split such that each cluster has a model with potentially uncommon factors. Prof. Cong argued that decision trees provide a framework of guiding clustering in panel datasets. Furthermore, decision trees have two advantages: 1. They are interpretable and transparent, and 2. they allow for nonlinear interactions, high dimension inputs and short observation windows. One of his findings is that a tangency portfolio based on clustered factor models deliver exceptional in-sample and out-of-sample performance.

Are Equity Option Returns Abnormal? IPCA Says No

Factor models do not only apply to equities but extend to other asset classes as well. In this vein, Amit Goyal from the University of Lausanne discussed the construction of factor models for option returns; rather than simply borrowing from the set of classic equity factors, he made the case for extracting factors directly from option returns via ML techniques.

Prof Goyal presented his latest work "Are Equity Option Returns Abnormal? IPCA Says No".[5] Current literature on factor models for equity options is relatively sparse and largely unsuccessful at explaining such abnormal returns. According to Goyal, these factor models have a few limitations. First, the factors are constructed only at the portfolio level and, as such, miss out on information that is present at the firm level and potentially even at the option contract level. Second, the models are typically static, in the sense that betas are not allowed to be time-varying. However, option returns have dynamic betas that can depend on firm and option characteristics. Third, these factor models leave substantial alphas for many option trading strategies.

Amit Goyal proposed an option factor model, inspired by the instrumented principal component analysis (IPCA) of Kelly, Pruitt, and Su (2019).[6] This model is well suited to price option returns, as it helps reducing the dimension of the many characteristics that are related to option returns, and thus allows for a parsimonious, yet intuitive way to model time varying betas. In total, the authors use 44 characteristics as predictors of option returns and as conditioning variables in IPCA.

The authors show that much of the profitability in equity option return strategies, that try to capture option mispricing by taking exposure to underlying volatility, can be explained by their proposed factor model. The alpha reduction, relative to competing static factor models, is between 50% and 75% depending on the competing model and the type of option position.

Factor Investing: A practitioner’s perspective

Against this backdrop of cutting-edge academic research into factor investing, there were two keynotes from quantitative investment professionals, speaking to how such academic insights can be translated into the practice of portfolio management. Bernhard Langer, CIO at Invesco Quantitative Strategies, took the audience on a 3-decade tour, reflecting on the early beginnings of quant investing, the current state of the art in developing systematic and factor investing strategies as well as the associated commercial aspects. Robeco’s Head of Quant Equity Research, Weili Zhou highlighted how

Robeco has contributed to the theory and practice of factor investing and what promises and pitfalls come with next generation quant investing.

Zhou identified three key drivers to continued success in quantitative investing. First, have a close tie with academia and follow a scientific approach in the investment process. Second, apply a pragmatic and prudent approach whilst being mindful of real-world applications, and their connection with sustainability. Third, constant innovation in the investment process is key. As an active quant manager, one constantly aims to identify uncorrelated alpha sources. This can be done by gaining an information advantage (e.g. by tapping alternative alpha via new data-sets) or by deploying state-of-the-art methods.

At Robeco, an important effort is devoted to capturing factors in our clients' portfolios, and the conference featured two Robeco research presentations advancing our thinking and practice of constructing factor portfolios. In this vein, Amar Soebhag stressed the importance of not p-hacking when it comes to design choices in building characteristic-based factor portfolio.[7] An important aspect in trading factors in practice is how much factor premium can be enjoyed after transaction costs are considered. Along these lines, Filip Bašić examined how to come up with transaction-cost optimized factor portfolios whilst staying true to the factors' genuine nature.

Robeco Sustainable Investing Prize

To stimulate the submission of cutting-edge research in both, quantitative and sustainable finance, the conference awarded two best paper prices. Benjamin Holcblat from the University of Luxembourg won the Invesco Factor Investing Price for his paper "Anomaly or Possible Risk Factors? Simple-To-Use Tests "together with Abrahama Lioui from EDHEC and Michael Weber from the University of Chicago.[8] Glen Gostlow from LSE was awarded the Robeco Sustainable Investing Prize for his paper "Pricing Physical Climate Risk in the Cross-Section of Returns".[9]

Using location-specific climate exposure measures, Gostlow tests for the existence of physical climate risk premia. He provides empirical evidence that the priced portion of hurricane risk commands a positive premium whilst the priced portion of heat stress commands a negative premium. Both exposure to sea-level rise and exposure to extreme rainfall command no risk premium. Most of the innovations in physical climate risks appear noisy. However, the unpriced portions co-vary with fundamental risks in the economy, suggesting agents struggle to price the risk, and can be explained by industry returns, common risk factors, and realisations of severe weather events.

Harald Lohre (left) and Glen Gostlow (right)

Conclusion

To summarize, the Frontiers of Factor Investing conference brought together the leading researchers in the field to discuss their latest thinking. The conference covered 60 studies and a broad range of different topics, ranging from theoretical asset pricing, natural language processing, climate finance, and machine learning. For investment practitioners, it is vital to support, engage and contribute to such gatherings for staying ahead and enabling the innovation of investment processes and solutions. We very much look forward to supporting the next edition.

References

1 Kölbel, J. F., Leippold, M., Rillaerts, J., & Wang, Q. (2022). Ask BERT: How regulatory disclosure of transition and physical climate risks affects the CDS term structure. Journal of Financial Econometrics, forthcoming.

2 Mishra, R., Gupta, D., & Leippold, M. (2020). Generating fact checking summaries for web claims. arXiv preprint arXiv:2010.08570.

3 Bingler, J. A., Kraus, M., Leippold, M., & Webersinke, N. (2022). Cheap talk and cherry-picking: What ClimateBERT has to say on corporate climate risk disclosures. Finance Research Letters, 102776.

4 Cong, Lin and Feng, Guanhao and He, Jingyu and Li, Junye, Uncommon Factors for Bayesian Asset Clusters (September 15, 2022). Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4219905

5 Goyal, A., & Saretto, A. (2022). Are Equity Option Returns Abnormal? IPCA Says No. IPCA Says No (August 19, 2022).

6 Kelly, B. T., Pruitt, S., & Su, Y. (2019). Characteristics are covariances: A unified model of risk and return. Journal of Financial Economics, 134(3), 501-524.

7 Soebhag, Amar and van Vliet, Bart and Verwijmeren, Patrick, Non-Standard Errors in Asset Pricing: Mind Your Sorts (June 14, 2022). Available at SSRN: https://ssrn.com/abstract=4136672

8 Holcblat, B., Lioui, A., & Weber, M. (2022). Anomaly or Possible Risk Factor? Simple-To-Use Tests. Simple-To-Use Tests (March 22, 2022). Chicago Booth Research Paper, (22-11).

9 Gostlow, Glen, Pricing Physical Climate Risk in the Cross-Section of Returns (December 9, 2019). Available at SSRN: https://ssrn.com/abstract=3501013