# QUANTVALLEY /FDR RESEARCH INITIATIVE



2020

# Activities and Events organized by the Research Initiative (QMI) – ANNUAL REPORT

This document describes the activities organized by the Quantitative Management Research Initiative (QMI) during its fifth year of existence. For internal use only.

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# QUANTVALLEY /FDR RESEARCH INITIATIVE "QUANTITATIVE MANAGEMENT INITIATIVE (QMI)"

## 1. INTRODUCTION

Hosted within the Fondation du Risque (FdR) and with the support of the Institut Louis Bachelier (ILB), the work conducted within the framework of this Research Initiative is principally carried out by teams from the Université Paris Dauphine - PSL and the ENSAE (Ecole Nationale de la Statistique et de l'Administration Economique). It benefits from a partnership with LFIS Capital.

## 1.1. The objectives of the QMI

In the post-2007 financial-crisis context, Quantitative Management professionals from the French Financial sector came together in 2010 to create QuantValley to promote Quantitative Finance and its benefits in terms of research, risk management and value creation for investors. The association was joined by GFI and UBS, and thanks to their support, the Quantitative Management Initiative (QMI) was born in early 2012. Today, the Quantitative Management Initiative (QMI), who is supported by LFIS Capital, is investing even more in the promotion of research and the development of interactions between the academic world and the Professional world of Quantitative management and is structured around the following themes:

- Developing quantitative research applied to asset management;
- Facilitating knowledge transfer between academic environments and asset management agents;
- Responding to the research issues of various private partners;
- Encouraging collaboration with one or more companies that are leaders in fields relating to quantitative management;
- Promoting the image of asset management based on quantitative approaches;
- Increasing and consolidating the high level of excellence by organising reflexion, research and training activities on an international scale relating to one or more themes of general interest;
- Reflecting on the evolution of regulation pertaining to asset management.

## 1.2. Research axes of the QMI

Amongst the research areas of most interest to the QMI are:

#### 1.2.1. Artificial Intelligence

#### **Statistical Signal Processing**

Application of signal treatment to the estimation of factorial models, the detection of outliers, the filtering of trends and the robust estimation of Kalman models is an active research field of the IdR QMI. The robust Kalman filter is in particular used in a project aiming to filter the leverage of Real Estate Private Equity funds form reported NAV. These funds are reporting on a quarterly basis, and the use of classic Kalman filter produces in general poor results in this specific context.

This first piece of research has been published in Journal of Asset Management in 2019. The outputs related to this research are exposed in a working paper that starts to be presented in academic conference in 2019. This topic is particularly relevant when the objective is to allocate money to a portfolio of different trends following systems.

The risk of this strategy is then linked to the probability of observe simultaneously breaks in trends characterizing different markets. We plan to continue in the coming years this strand of research, and in particular through the use of machine learning techniques to rely observed trends to economic environment variables. This will make the link between this topic and the following one.

#### Big data, machine learning and the new sources of information (Google, Twitter)

Two working papers by D.E. Allen, M. McAleer, and A. Singh are focused on Big Data. E. Benhamou has several papers on deep learning applied to finance. This research has been presented several times. See

Eric Benhamou, Serge Darolles and Gaëlle Le Fol are working on a project on "Illiquidity in Risk Analysis and Large dimensions: an application to Mutual Funds". The idea is to propose risk measures that not only take into account the investment of a funds as well as the investments of other funds that use the same risky assets.

Finally, Serge Darolles, Gaëlle Le Fol, and Béatrice Sagna with another co-author are working on volume prediction (univariate and multivariate) models using machine learning method. Their first results presented in a working paper show that machine learning technics outperform ARMA and SETAR specification both in and out of sample. Two additional papers will be written in this strand of research. The first one discusses the impact of the discretization step in the tracking of the VWAP price. The second relies all this research on volumes to the development of factor investing strategies.

A « Quantitative Asset Management » session leaded by Gaëlle Le Fol and Serge Darolles, Members of the QMI has been organised at the Computational Financial Econometrics (CFE) conference in London in December 2020 (see past conferences).

Finally, we have organized in January 2020 our second Hackathon – AI and ML in Asset management. 64 participants/26 teams. See page 22.

#### Momentum risk premia

Serge Darolles is working with his former PhD Student Charles Chevalier on the characterization of a Multi-asset Trend Following Risk Premia that can be used to explain the cross-sectional dispersion observed in the CTA space. The corresponding risk factor can be used to improve the explanatory power of the linear factor models generally used to analyse hedge fund portfolios. A first publication in Journal of Asset Management in 2019 reports all the results obtained on momentum strategies.

A second paper ("Diversifying Trends") by the same co-authors has been presented at the CFE Conference in London in December 2020 and submitted to Econometrics and Statistics. The main objective of this research is to extract what is in common between trends observed on different markets.

Finally, Paul Ehling and Costas Xiouras in their project "Asset Pricing with Endogenous beta", founded in 2018, study the cross-section of expected returns in a framework where betas are determined endogenously. Their theoretical analysis shows that the stocks' betas fluctuate significantly over time and are affected by both the state of the economy and the individual stock states, i.e. their characteristics.

#### 1.2.2. Risk & Crowding

#### Risk disaggregation and portfolio allocation

A change in the structure of a fund's client base affects the potential mismatch between the liquidity of its assets and liabilities. An asset/liability approach for liquidity management is therefore critical and requires a client behaviour model. Serge Darolles, Gaëlle Le Fol and Ran Sun are working on investor's behaviour and the consequences on funding liquidity risk.

Marius Zoican is working with a co-author on a new project where they look at institutional investor attention. They build a model where analysts who compete for scarce investor attention to maximize volume for brokerage houses end up clustering in a small subset of stocks. They find that it explains 21.39% of the cross-sectional variation in analyst coverage.

Hugues Langlois in the project "Forecasting Portfolio Weights", funded in 2018, proposes a new methodology to compute dynamic mean-variance optimal portfolios. The originality of his approach is to directly forecast portfolio weights. This research should become a webinar in 2021.

#### Contagion and funds flows

Serge Darolles, Gaëlle Le Fol and her PhD Student Béatrice Sagna work with another co-author on some multivariate volume prediction methods applied to the circulation of liquidity within a portfolio. This paper research has been

presented several time at some international conferences in the past and they are actually working on a new version of this paper

Serge Darolles, Gaëlle Le Fol and Ran Sun work with another co-author on fund flows predictions, clustering effects and over-dispersion with implications on fund liquidity risk.

#### **Estimation risk for portfolios**

Several methods are compared to jointly estimate the market risk of the returns of portfolios and evaluate the estimation risk.

In particular, an approach based on the reconstitution of a virtual portfolio (using the current composition of the portfolio) seems preferable to the cumbersome multivariate approaches when the portfolio is based on a large number of assets. The comparison relies on asymptotic theory and numerical experiments. This research, conducted by Jean-Michel Zakoian with coauthor, has been presented at several seminars and international conferences (see Seminar and conference) and published in the Journal of Econometrics (see Publications page 16).

#### Systemic risk and stress exercises

Several researches have been conducted by Christian Gourieroux to detect the systemic risks present in a portfolio, define rating for systemic risk, or construct scenario generators to measure the impact of systemic shocks. Gagliardini, Gourieroux, Rubin (2019) develop a systematic factor model for a joint analysis of the ranking of portfolio managers based on a high dimensional analysis of 900 stocks returns. Boloorforosh, Christoffersen, Fournier, Gourieroux (2019) consider the market beta exposures of stocks and allows for stochastic market betas exposures of stocks and allows for stochastic market betas with possible comovements. Such nonlinear dynamic factor models are usually difficult to estimate by maximum likelihood due to the high dimensionality. Gagliardini, Gourieroux (2019) introduce a moment method based on Laplace transform to get consistent approximations in this big data framework. This method is particularly useful when we have to consider large panels of assets, such as in Brownlees, Darolles, Le Fol, Sagna (2019).

#### Alternative Risk Premia

Given the sharp increase of the number of alternative risk premia discovered by academics and practitioners, several issues need to be addressed: the factor construction methodologies, the consequences for portfolio diversification, the persistence of the alternative risk premia.

Regarding the first two issues, Marie Lambert et al. are working on construction rules of risk factors and the design of smart beta strategies. A proper methodology to stratify stock universe into style buckets is key for the design of persistent risk factors, asset allocation and performance attribution. The two working papers have been presented at academic and practitioner conferences and seminars (FMA – San Diego, Quant Vision Summit, AFFI, etc. see seminar and conferences). Marie Lambert et al. also works on the design of alternative risk premia capturing nonlinear payoffs. The working paper on the gamma trading of hedge funds have also been presented at several conferences and seminars.

Regarding the persistence of the alternative risk premia, Serge Darolles and Marie Lambert are working on the economic cycle of alternative risk premia and the change in business model from active to passive management for those investment strategies. Serge Darolles has presented the paper at Ecosta 2018 in Hong Kong and at the AFG in November 2018. A new version of this paper has been written on 2019. Several presentations at the Global Investors Forum (Paris, November 2020) and CFE (London, December 2020) has followed.

On the same topic of alpha persistence, Serge Darolles, Gaelle Le Fol and Gulten Mero are working on a regime switching approach to study the existence of risk premia. They apply their methodology to the size premia. The paper is revise and resubmit for the review Finance.

#### **Derivatives in Asset Management**

This new strand of research is related to the arrival of Jean-Guillaume Mémin in the research team. Jean-Guillaume starts his PhD thesis at LFIS Capital, on the optimal use of derivatives in the design of trading strategies. Basically, different solutions exist to implement a trading idea, and the objective of this thesis is to develop a theoretical framework to study which is the best implementation solution – taking a position on the spot or using derivatives. We expect to publish the first paper on this new topic in 2021.

#### **1.2.3. Implementation challenges**

#### Listed market liquidity

Looking at serial correlations, Serge Darolles, Gaëlle Le Fol and Ran Sun are working on hedge funds liquidity and managers' skills (See Working papers page 13).

Fabrice Riva is for his part, with two co-authors, working on ETF liquidity (See Working papers). Marius Zoican and another researcher are also working on ETF liquidity ("The value of ETF liquidity"). They find that identical ETFs can exploit different investor clienteles to charge different management fees for holding identical portfolios. Highly liquid ETFs can extract 0.47 bps in higher fees than their competitors for each 1 bp of narrower bid-ask spread.

In their project "Stock Market Liquidity and Trading Costs of Asset Pricing Anomalies", Tamara Nefedova, with some co-authors, uses transaction-level data from Ancerno to investigate implicit cost dynamics and estimate transaction costs associated with trading asset-pricing anomalies. They find that the related costs are considerably lower than documented by previous studies.

Marius Zoican with another co-author examine the optimal settlement cycle for securities exchanges. They find that immediate settlement (T+0), as implemented for example on a distributed ledger, is optimal if failure-to-deliver penalties are negatively correlated with security borrowing costs. This paper has been published in Management Science, see Published papers page 17.

#### Algo and/or High frequency trading

Optimisation of the VWAP (Volume Weighted Average Price) replication algorithms, link between the speed of placing orders on the market and the arrival of information, liquidity trade-offs, maximum trading capacity are areas of research in which QMI is regularly investing.

Serge Darolles, Gaëlle Le Fol, and Béatrice Sagna with another co-author are working on basket VWAP strategies. They first have papers of the volume forecasting methodology and now use this approach to filter from the realized volume the connections between stocks belonging to a same market.

Jean-Michel Zakoian and his co-authors worked on Functional data analysis (FDA), which is an innovative approach towards modelling time series data. In FDA, densely observed data are transformed into curves and then each (random) curve is considered as one data object. This research was published in Journal of Econometrics, see Published papers page 16.

The current research, with Ophélie Couperier and another co-author, aims at introducing functional covariates that takes into account the influence of intraday price variations in the volatility.

Marius Zoican and his co-authors find that on discrete-time markets, faster trading enhances arbitrageur competition. In contrast to continuous-time markets, lower latencies can improve liquidity on batch auction markets. Marius Zoican with another co-author propose an experimental trading platform where participants face speed bumps and invest in low-latency trading technology. They find that asymmetric speed bumps reduce investment in low-latency by 20%, and a one standard deviation larger speed bump further reduces low-latency investment by 8.33%.

These two papers are published in Journal of Financial Markets, see Published papers page 17.

#### 1.3. The QMI's organization

#### **1.3.1.** The steering committee

The steering committee reviews, monitors and prioritizes major QMI projects. Scientifique Director

Gaëlle Le Fol, Professor, Université Paris-Dauphine and CREST

**General Secretary** 

Fabrice Riva, Professor, Université Paris - Dauphine

Researchers from l'ENSAE and Université Paris-Dauphine

Serge Darolles, Professor, Université Paris -Dauphine Jean-Michel Zakoïan, Professeur, CREST-ENSAE ParisTech

#### **Other Members**

Gouriéroux G., Professor, Université de Toronto

#### 1.3.2. The Advisory Board

The Advisory board assists the Steering Committee in its supervising tasks over the activities of the project. The advisory Board members are:

Representing LFIS Capital : Sofiène Haj-Taieb

Representing l'ENSAE ParisTech : Le Directeur Général du GENES ou son représentant

Representing the Université Paris-Dauphine : Bruno Bouchard

Representing the Risk Fondation: Jean-Michel Beacco

Qualified Person: Charles-Albert Lehalles (CFM)

International Experts: Michel Crouhy (Natixis), René Garcia (Univ. Montreal & TSE), Michael Rockinger (University of Lausanne), and Ronnie Sadka (Boston College)

#### 1.3.3. The secretariat

Pauline de Saint Quentin, the secretary of QMI can be contacted at <u>Pauline.desaintquentin@dauphine.psl.eu</u> or by telephone: +33 1 41 16 76 19.

#### 1.3.4. The QMI's researchers



E. Bacry, CNRS and Ecole Polytechnique



C. Gouriéroux, Toronto University



S. Darolles, Université Paris - Dauphine



E. Jouini, Université Paris - Dauphine



M. Lambert, HEC Liège (Liège Université)



G. Le Fol, Université Paris - Dauphine



G. Mero, Université de Cergy-Pontoise



T. Nefedova, Université Paris - Dauphine



F. Riva, Université Paris – Dauphine



J.-M. Zakoïan, CREST and University Lille 3.



M. Zoican, Toronto University



**E. Benhamou**, PhD Student, Université Paris-Dauphine



**O. Couperier**, PhD student, CREST-ENSAE, ATER Université Paris - Dauphine



**B. Sagna**, PhD Student, Université Paris-Dauphine



Arthur Stalla-Bourdillon, PhD Student, Université Paris- Dauphine



H. Chan, PhD Student, Université Paris -Dauphine



J.-G. Mémin, PhD Student, Université Paris-Dauphine



J. Royer, PhD Student, CREST-ENSAE

#### 1.3.5. The QMI's associate researchers



Akindynos-Nikolaos Baltas, Visiting Researcher, Imperial College, Quantitative Analyst at UBS Investment Bank



D.E. Allen, Econometric Institute, Erasmus School of Economics, Erasmus University Rotterdam, The Netherlands.



Paul Ehling, Professor, Norwegian Business School, Norway.



D. Keenan, Professor of Finance, Université de Cergy-Pontoise



Robert Kosowski, Professor, Center for Hedge Fund Research & Risk Management Laboratory at Imperial College Business School



Hugues Langlois, Assistant Professor, HEC Paris



Dong Lou, Financial Markets Group, London School of Economics



M. McAleer, Professor of Quantitative Finance, Econometric Institute, Erasmus School of Economics, Erasmus University Rotterdam



Christopher Polk, Professor, Financial Markets Group, London School of Economics



Abhay Kumar Singh, PhD (Finance), MBA, B. Tech (I T)



Costas Xiouros, Associate Professor, Norwegian Business School, Norway.

## 2. RESEARCH ACTIVITIES

This research initiative aims to be a means of exchange and reflexion where research themes emerge naturally, and become the starting point of research articles in the best international journals. The QMI must also be able to create a research community around themes of interest to management companies by calling for research projects nationally and internationally and by reinforcing the QMI member teams by recruiting research assistants and publishing doctoral contracts.

#### 2.1. Research Publications

- Date: 2020
- Themes: Quantitative Management

#### 2.1.1. Working papers

Allen, D.E., McAleer, M. and Singh A.K., An entropy-based analysis of the relationship between the DOW JONES Index and the TRNA Sentiment series. Working paper.

Allen, D.E., McAleer, M. and Singh A.K., Daily Market News Sentiment and Stock Prices. Working Paper.

Atif, J., A. Auger, E. Benhamou, and R. Laraki, A new approach to learning in Dynamic Bayesian Networks (DBNs). Working Paper.

Atif, J., A. Auger, E. Benhamou, and R. Laraki, A discrete version of CMA-ES. Working Paper.

Atif, J., A. Auger, E. Benhamou, and R. Laraki, Operator norm upper bound for sub-Gaussian tailed random matrices, Working Paper.

Auray, S., and C., Gourieroux: Procyclicité des régulations Financières, CREST Working Paper.

Baltas A.-K., and R. Kosowski, Momentum Strategies in Futures Markets and Trend-following Funds. Working paper and Funded Paper QMI.

Becam, A., Darolles. S. and Le Fol, G., Serial correlation and time-varying liquidity in the hedge fund industry, QMI Working paper.

Becam, A., Darolles. S. and Le Fol, G., Smoothed Returns and Managers' skills, QMI Working paper.

Benhamou E., A few properties of sample variance, Working paper.

Benhamou E., Variance Reduction in Actor Critic Methods (ACM), Working Paper and SSRN 3424668.

Benhamou E., Similarities between policy gradient methods (PGM) in reinforcement learning (RL) and supervised learning (SL), Working Paper and SSRN 3391216.

Benhamou E., S. Darolles and G. Le Fol, Risk Analysis and Large Dimensions: Applications to mutual Funds, Project selected by Europlace Institut of Finance, € 10,000.

Benhamou E., B. Guez, and N. Paris, Omega and Sharpe Ratio, Working Paper and SSRN 3469888.

Benhamou E., D Saltiel, B. Guez, N. Paris, Testing Sharpe ratio: luck or skill?, Working Paper and SSRN 3391214

Benhamou E., D. Saltiel, S. Ungari, A. Mukhopadhyay, J Atif, Augmented Asset Management with Deep Reinforcement Learning, arXiv preprint arXiv:2010.08497

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Benhamou E., D Saltiel, JJ Ohana, J Atif. Detecting and adapting to crisis pattern with context based Deep Reinforcement Learning, arXiv preprint arXiv:2009.07200 2 2020

Boeckelmann L, and A. Stalla-Bourdillon, International liquidity: structural estimation of time varying spillovers, Working paper.

Boeckelmann L, and A. Stalla-Bourdillon, Structural Estimation of Time-varying Spillovers: an Application to International Credit Risk Transmission in the Euro Area, Working paper.

Borgy, V., Idier, J. and Le Fol, G., Liquidity Problems in the FX market: Ask for the BIL, Working paper SSRN.

Briere, M., C.-A. Lehalle, T. Nefedova, Tamara and A. Raboun, Stock Market Liquidity and the Trading Costs of Asset Pricing Anomalies (April 24, 2019). Université Paris-Dauphine Research Paper, SSRN No. 3380239.

Brolley M. and M. Zoican, Liquid Speed: On-Demand Fast Trading at Distributed Exchanges, Working Paper and SSRN 3377346.

Brown D., S. Kovbasyuk and T. Nefedova, Is There Skill in the Game? Institutional IPO Allocations, Working Paper.

Brownlees C., Darolles S., Le Fol G., and B. Sagna, "Forecasting Intra-daily volume in large panels of assets for basket VWAP trading," working paper

Calamia A., Deville L. and F. Riva, The Provision of Liquidity in ETFs: Theory and Evidence from European Markets, Working Paper.

Calvez L., V. Czellar, and C. Gouriéroux, "Structural Dynamic Analysis of Systematic risk", Working paper.

Chevalier, C., and S. Darolles, Diversifying Trends, Submitted at Econometrics and Statistics, 2020.

Dale, W., Darolles, S., Lambert, M., and G. Monarcha: The Missing Link between Active and Passive Management, 2020.

Darolles S., Dubecq, S., and C., Gourieroux. Contagion analysis in the banking sector. Working paper.

Darolles S., Dudek, J. and Le Fol, G., MLiq a Meta Liquidity Measure, working paper Université Paris - Dauphine.

Darolles S., Gagliardini, P., and C., Gourieroux, Survival of Hedge Funds: Frailty vs Contagion, Working paper.

Darolles S., G. Le Fol and R. Sun, Liquidity Risk and Investor Behavior: Issues, Data and Models", Working paper.

Darolles S., and G. Roussellet, Managing hedge fund liquidity risks, working paper.

Darolles S. and Vaissié, M., The Benefits of Dynamic Risk Management: Mitigating Downside Risk Without Compromising Long-Term Growth Prospects, Working paper SSRN.

Deville L., J. Raposo, and F. Riva, "Event studies and (endogenous) zero returns", working paper.

Eisele A., T. Nefedova, Tamara and G. Parise, Are Star Funds Really Shining? Cross-Trading and Performance Shifting in Mutual Fund Families, BIS Working Paper No. 577, Available at SSRN 2831690.

Eisele A., T. Nefedova, Tamara and G. Parise, Predation versus Cooperation in Mutual Fund Families. Working paper, SSRN 2082369.

Evans R., T. Nefedova and G. Paris, Front-trading and Information Environment in Mutual Fund Families. Working paper.

Fays, B., G. Hübner, and M. Lambert, Gamma Trading Skills in Hedge Funds. Working paper.

Fays, B., G. Hübner, and M. Lambert, The Seasons of the True Size Anomaly. Working paper.

Fays, B., M. Lambert, and N. Papageorgiou, "Risk optimizations on basis portfolios: The role of sorting". Working paper.

Francq, C., and J.M., Zakoian, Joint Inference on Market and Estimation Risks in Dynamic Portfolio", Working paper.

Francq, C., and J.M., Zakoian, Expected Shortfall Estimation in Volatility Models", Working paper.

Francq, C., and J.M. Zakoïan, Adaptiveness of the empirical distribution of residuals in semi-parametric conditional location scale models. Working paper.

Gourieroux, C., and J.C., Heam: "Funding Liquidity Risk in a Regulatory Perspective", submitted Journal of Banking and Finance.

Gourieroux, C., and J., Jasiak, A Stochastic Tree with Application to Bubble Modelling and Pricing, CREST-DP.

Gourieroux, C., and J., Jasiak, Dynamic Deconvolution of Independent AR(1) Sources, Working paper.

Gourieroux, C., and J., Jasiak, Inference for Noisy Long Run Components, submitted Journal of Econometrics.

Gourieroux, C., and Y., Lu, Staying at the Zero-Lower Bound with Embedded Markov Chain, CREST-DP.

Gourieroux, C., and A., Monfort, Economic Scenario Generators and Incomplete Markets, CREST DP.

Gourieroux, C., and A., Monfort, Model Risk Management, Valuation and Governance of Pseudo Models, submitted Journal of Econometrics and Statistics.

Gourieroux, C., Monfort, A., and J.P., Renne, Disastrous Defaults, R&R, Review of Finance.

Gourieroux, C., Monfort, A., and J.P., Renne: "Group Transformation Models : A New Interpretation of Intercept in Semi-Parametric Econometrics, CREST-DP.

Gourieroux, C., and A., Tiomo, The Evaluation of Model Risk for Probability of Default and Expected Loss, R&R Journal of Banking and Finance.

Haas M. D. and M. A. Zoican, Beyond the Frequency Wall: Speed and Liquidity on Batch Auction Markets, Working paper. This paper received the <u>Josseph de la Vega Prize 2016</u>.

Lambert M. and N. Moreno, The Earnings Announcement Day Puzzle in the Value Premium, Working paper.

Langlois H., Forecasting Portfolio Weights, Funded Project 2019 and Working Paper.

Lou D., and C. Polk, The Booms and Busts of Beta Arbitrage: Measuring the extent of the Low-Beta Crowd. Working paper and Funded Project 2018.

T. Marta and F. Riva, Do ETFs increase the co-movements of their underlying assets? Evidence from a switch in ETF replication technique, Working paper.

Martineau C. and M. Zoican, Investor Attention and the Cross-Section of Analyst Coverage. Working Paper and SSRN 3376162 won "Outstanding Paper in Investments" Award at Southern Finance Association 2020.

Mhalla, L., Hambuckers, J., and M. Lambert, M, Extremal connectedness and systemic risk of hedge, Working paper.

Mero G, False discoveries in Hedge Fund performance and business cycles, Working Paper.

Nefedova T., Tippers and tippees: Brokers' pre-release of price-sensitive information to their VIP clients, Working paper.

Royer J., Conditional asymmetry in ARCH(∞) models, Working Papers.

Saltiel D., E Benhamou, Sélection efficace de variables par descente par coordonnée avec garanties théoriques. hal preprint 2020, <u>https://hal.archives-ouvertes.fr/hal-02886506/document</u>

Xiouros C., and P. Ehling, Asset Pricing with Endogenous beta, Funded Project 2019.

Zoican M., Asset management at the zero-fee bound, Working Paper.

#### 2.1.2. Published Papers

Benhamou E., D. Saltiel, Similarities between policy gradient methods in reinforcement and supervised learning, ESANN 2020 proceedings, European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning. Online event, 2-4 October 2020, i6doc.com publ., ISBN 978-2-87587-074-2. Available from <a href="http://www.i6doc.com/en/">http://www.i6doc.com/en/</a>.

Benhamou E., D. Saltiel, S. Verel, Bayesian CMA-ES: a new approach, GECCO '20: Proceedings of the 2020 Genetic and Evolutionary Computation Conference Companion, July 2020, p. 203–204 <a href="https://doi.org/10.1145/3377929.3389913">https://doi.org/10.1145/3377929.3389913</a>

Boloorforoosh, A., Christoffersen, P., Fournier, M., and C., Gourieroux, Beta Risk in the Cross-Section of Stocks and Options, **Review of Financial Studies**., Volume 33, Issue 9, September 2020, Pages 4318–4366.

Darolles S., G. Le Fol and G. Mero, Timing the Size Risk Premia, Working paper. Revise and resubmit **Finance**.

Djogbenou A., Gouriéroux G., and J. Jasiak, « Testing for Endogeneity of COVID-19 Patient Assignments », Forthcoming Journal of Statistical and Econometric Methods, 2020.

Eisele, A., T. Nefedova, G. Parise, and K. Peijnenburg, Trading Out of Sight: An Analysis of Cross-Trading in Mutual Fund Families (February 24, 2019). Forthcoming **Journal of Financial Economics**. Available at SSRN: https://ssrn.com/abstract=2023976 or http://dx.doi.org/10.2139/ssrn.2023976.

Francq, C. and J.M. Zakoïan, Virtual Historical Simulation for estimating the conditional VaR of large portfolios, Journal of Econometrics, 127, 356-380.

Francq, C., and J.M. Zakoïan, Testing the existence of moments for GARCH processes, Forthcoming **Journal of Econometrics**.

Gouriéroux G., A. Hencic, and J. Jasiac, Forecast performance and bubble analysis in noncausal MAR(1, 1) processes, forthcoming International Journal of Forecasting, 2020.

Gourieroux, C., and Y., Lu, Long Term Care and Longevity, Revise and resubmit Journal of Econometrics.

Gouriéroux G., A. Montfort, and J.P. Renne, Identification and Estimation in Nonfundamental Structural Models, **The Review of Economic Studies**, vol. 87, 2020, p. 1915–1953.

Gouriéroux G., J. Jasiak, and A. Montfort, Stationary Bubble Equilibria in Rational Expectation Models, **Journal** of Econometrics, n° 218, 2020, p. 714–735.

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Gouriéroux G., and A. Monfort, Model Risk Management: Valuation and Governance of Pseudo Models, Forthcoming **Econometrics and Statistics**, 2020.

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Lambert, M., and F. Platania, F., The macroeconomic drivers in hedge fund beta management, **Economic Modelling**, 91, 65-80.

Menkveld, A., E. Pagnotta and M. Zoican, Does Central Clearing affect Price Stability? Evidence from the Nordic Equity Markets, Working paper and SSRN 2350762, Revise and resubmit at the **Journal of Financial Economics**.

Nefedova T., and G. Pratobevera, Do Institutions Play Hide-and-Sell in the IPO Aftermarket?, **Journal of Corporate Finance**, Volume 64, October 2020, 101627.

#### 2.2. Call for projects

There was no call for project in 2020.

#### 2.3. Completed projects

1. <u>beta</u>, Costas Xiouros, Associate Professor and Paul Ehling, Professor at Bl Norwegian Business School, Norway.

We study the cross-section of expected returns in a framework where the CAPM holds either conditionally or unconditionally and dividend dynamics determine market  $\beta$ s. Calibrating the discount factor and aggregate dividends allows matching standard features of aggregate stock market returns and the market price-to-dividend ratio. In the calibration, we see significant fluctuations in market  $\beta$ s due to both aggregate and individual shocks. These results explain, on the one hand, why stock characteristics contain considerable power in predicting returns. On the other hand, they are consistent with empirical failures of the unconditional CAPM, even in our framework when it holds conditionally.

2. Forecasting Portfolio Weights, Hugues Langlois, Associate Professor at HEC.

We propose a new methodology to implement unconditionally optimal dynamic mean-variance portfolios. We model portfolio allocations using an auto-regressive process in which the shock to the portfolio allocation is the gradient of the investor's realized certainty equivalent with respect to the allocation. Our methodology can accommodate transaction costs, short-selling and leverage constraints, and a large number of assets. In out-of-sample tests using equity portfolios, long-short factors, government bonds, and commodities, we find that its risk-adjusted performance, net of transaction costs, is on average more than double that of other benchmark allocations.

## 2.4. Ongoing PhD thesis, PhD defense and placement

- Charles Chevalier, « Trois essais sur les strategies de suivi de tendance », December 17, 2019, under the supervision of Serge Darolles. Charles Chevalier is Quantitative Analyst at KeyQuant.
- Hector Chan (ongoing), under the supervision of Serge Darolles.
- Ophélie Couperier (ongpoing), under the supervision of Christian Franck, Christophe Hurlin and Jean-Michel Zakoian. Ophélie is also teaching assistant (ATER) at Université Paris-Dauphine-PSL.
- Jean-Guillaume Mémin (ongoing), under the supervision of Serge Darolles.
- Julien Royer (ongoing), under the supervision of Christian Franck, Jean-Michel Zakoian.
- Béatrice Sagna (ongoing), under the supervision of Gaëlle Le Fol.
- Arthur Stalla-Bourdillon (ongoing), under the supervision of Gaëlle Le Fol.

## 3. RESEARCH EXPOSURE AND DIFFUSION

Over and above research production, the QMI aims to distribute quantitative management academic research throughout the scientific community but also towards quantitative management professionals (knowledge diffusion). To this end, the QMI's research will be presented in international conferences, within the framework of an annual conference addressed to academics and professionals. Furthermore, training (research applications) will be developed and the website will propose research articles and webinars than put that research into practice.

## 3.1. VISIBILITY & DIFFUSION OF RESEARCH

#### 3.1.1. 14th CSDA International Conference (CFE 2020)

Organization of one session at the Computational and Financial Econometrics, Virtual conference, December 2020

- Quantitative Asset Management, Session CO305.

**G. Le Fol** Organizer **and S. Darolles**, Chairman and organizer, Université Paris-Dauphine, Members of the QMI

- Futures Market Liquidity and the Trading Cost of Trend Following Strategies, **Charles Chevalier**, Université Paris-Dauphine, Member of the QMI.
- Do ETFs increase the comovements of their underlying assets? Evidence from a switch in ETF replication technique, **Thomas Martha**, Université Paris Dauphine, France
- Factor Investing: The Missing Link between Active and Passive Management, **Wale Dare**, HEC Liège, Belgium.
- ML in Asset Management, Rafael Molinero, Molinero Capital Management.

#### 3.1.2. Seminar and conference participations

QMI's researchers have presented their work at several conferences and seminars:

"Agency costs of dry powder in private equity funds", Lambert, M., Scivoletto, A., and T. Tykvova

• Finance seminar, Centre Finance Durable TSE, Toulouse, France, September 21.

"Bridging the gap between Markowitz planning and deep reinforcement learning", E. Benhamou, D. Saltiel, S. Ungari, A. Mukhopadhyay

• ICAPS 2020: PRL workshop, October 22-23, online.

"Conditional asymmetry in ARCH(∞) models", J. Royer

- New Results on Time Series and their Statistical Applications CIRM Meeting Marseille, Sep. 2020
- CREST seminar in Financial Econometrics Palaiseau, Oct. 2020

• 14th International Conference on Computational and Financial Econometrics (CFE 2020) - Dec. 19-21.

"Detecting and adapting to crisis pattern with context based Deep RL", E Benhamou, D Saltiel, JJ Ohana, J Atif

• ICPR 2021: full paper, <a href="https://www.micc.unifi.it/icpr2020/">https://www.micc.unifi.it/icpr2020/</a>, online forthcoming January 2021.

"DRLPS: Deep Reinforcement Learning for Portfolio Selection", E. Benhamou, D. Saltiel, J.J. Ohana, R. Laraki, J. Atif

• ECML PKDD 2020: demo paper, September 13-18, online.

"Do ETFs increase the co-movements of their underlying assets? Evidence from a switch in ETF replication technique", T. Marta and F. Riva

• 14th International Conference on Computational and Financial Econometrics (CFE 2020) - Dec. 19-21.

"Extremal connectedness and systemic risk of hedge funds", Mhalla, L., Hambuckers, J., and M. Lambert

- University of Trento STaTA (Statistics: Theory and Applications) Seminar, Trento, Italy, December 11.
- KU Leuven Statistics Seminar (research groups Faculty of Science and Faculty of Economics and
- Business Leuven Statistics Research Centre), October 29.

"Factor Investing and the ARP Economic", Lambert, M. (2020, October 09). Cycle.

• Global Invest Forum, October 9, online, Paris, France.

"Investor Attention and the Cross-Section of Analyst Coverage", C. Martineau, and M. Zoican

- Northern Finance Association, September 25-27, Univ. Calgary (Virtual Event), Canada.
- 2nd Future of Financial Information Conference, August 17-19, Frankfurt (virtual event), Germany.
- Southern Finance Association, won "Outstanding Paper in Investments" Award, November 19-20, Univ. Central Florida, USA (Virtual event).

"Knowledge discovery with Deep RL for selecting financial hedges", E. Benhamou, D. Saltiel, S. Ungari, A. Mukhopadhyay

• AAAI forthcoming 2021: KDF workshop, <a href="https://aaai-kdf.github.io/kdf2021/accepted\_papers">https://aaai-kdf.github.io/kdf2021/accepted\_papers</a>

"Learning from Intra-daily trading volumes", B. Sagna

- CFE, 14-16 December, 13th International Conference on Computational and Financial Econometrics (CFE 2019), London, United Kingdom.
- Workshop ANR Multirisk 2019, April 28, Florence, Italy.

"Liquid Speed: A Congestion Fee for Low-Latency Exchanges", M. Brolley, and M. Zoican

- European Finance Association, August, 20-21, Helsinki, Finland (virtual event).
- 3rd Toronto FinTech Conference, November 5-6, online.
- Southern Finance Association, November 19-20, Univ. Central Florida, USA (Virtual event).
- Financial Management Association, October 19-23 (virtual event), Georgetown Univ., USA.

"Similarities between policy gradient methods in reinforcement and supervised learning", Benhamou E., D. Saltiel,

 ESANN 2020 proceedings, European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning. Online event, 2-4 October 2020, i6doc.com publ., ISBN 978-2-87587-074-2. Available from <a href="http://www.i6doc.com/en/">http://www.i6doc.com/en/</a> "Stock Market Liquidity and the Trading Costs of Asset Pricing Anomalies", Brière M., C.-A. Lehalle, T. Nefedova and A. Raboun

• 12th Annual Hedge Fund Research Conference, January 16-17, Paris, France.

"Structural estimation of time-varying spillovers", A. Stalla-Bourdillon and L. Boeckelmann

- Workshop ANR Multirisk 2019, April 28, Florence, Italy.
- Doctoral presentation, Université Paris Dauphine, September 9, Paris, France.
- Banque de France PhD Workshop, June 26, Paris, France.
- Macroeconometric Workshop, December 12, Berlin, Germany.

"Testing the existence of moments for GARCH processes", J.-M. Zakoian

- Workshop "Time Series Models: Theory and Applications", January 2020, Venice, Italy
- Econometric Society World Conference (online), August 2020, Milan, Italy
- Workshop "New Results on Time Series and their Statistical Applications", September, CIRM Luminy

"The EAD puzzle in the value premium", M. Lambert,

• Hedge Fund conference (Poster session), January 17, online, Paris, France

"The Value of ETF Liquidity", M. Khomyn, T. Putnins and M. Zoican

- European Finance Association, August 20-21, Helsinki, Finland (virtual event).
- Northern Finance Association, September 25-27, Univ. Calgary (Virtual Event), Canada.
- 4th SAFE Market Microstructure Conference, August 17-19, online.

"Time your hedge with Deep RL", E Benhamou, D Saltiel, S Ungari, A Mukhopadhyay

• ICAPS 2020: workshop Finplan, <u>https://icaps20subpages.icaps-conference.org/workshops/finplan/</u>online, October 19-30.

" Trade Selection with Supervised Learning and OCA", D. Saltiel, E. Benhamou, R. Laraki, and J. Atif,

• ECML PKDD 2020: MIDAS workshop full paper, <u>http://midas.portici.enea.it</u>

#### 3.2. Webinars

Because of the pandemic, we were not able to organize our annual events (QuantVision Summit & Round table) and as a consequence, we could not have a presentation of the two projects that we funded and are now completed (see <u>Completed Project</u> page 20). The presentation of two projects will finally take the form of two 2 webinars that we are currently preparing with LFIS Capital and the Institut Louis Bachelier.

#### 3.3. Annual events

Every year, the QMI organizes some events. Intended for quantitative management experts – academics, professionals and journalists – it will aim to combine the research undertaken by members of the QMI, projects financed by the QMI and research by internationally renowned researchers, by organizing a guest session and presentation sessions for research articles. A roundtable has also been organized in which academics, journalists and professionals will be invited to take part in a debate.

However, this year we only had a roundtable.

#### 3.3.1. Annual conference and annual round table

Unfortunately, there could not be any conference in 2020. However, there will be an online round table in March 2021 on "Environmental challenges, can sustainable finance be one of the solutions?".

#### 3.3.2. Hackathon

We organized on February 28-29, 2020, the second Hackathon - Intelligence Artificielle & Machine Learning

This event was organized by QMI, led by research teams of Université Paris Dauphine, ENSAE and the support of LFIS and SESAMm.

64 candidates/26 teams composed of students, young graduates, researchers and engineers, from Birbek University of London, Centrale Lyon, Centrale Supelec, City University of London, Ecole Polytechnique, EMLyon, ENS Paris Saclay, ENSAE, ENSAI, ESME, ESSEC, HEC Lausanne, HEC Liège, IMT Atlantique, New York University, Université Aix-Marseille, Université Paris Dauphine, Université Paris Diderot, Université Paris Est/Marne La Vallée, de Sorbone Université and Télecom ParisTech, have been working for 24 hours to explore the fields of artificial intelligence and machine learning in the asset management industry. The results of the competition are below.

Nom	Prénom	Mme/M.	Ecole/Université	Master	EQUIPE	SCORE	RANG
BLANCHARD	Eléonore	Mme	ENSAE & Université Paris Dauphine	Master Spécialisé Data Science & Master 272	MSDS	59,61	1
DURAND	Axel	М.	ENSAE & IMT Atlantique	Master Spécialisé Data Science	MSDS	59,61	1
LY	Yannick	М.	ENSAE & Université Paris Dauphine	Master Spécialisé Data Science & Master 272	MSDS	59,61	1
TAN	Jing	Mme	ENSAE & Université Paris Dauphine	Master Spécialisé Data Science & Master 272	MSDS	59 <i>,</i> 61	1
AGUIRRE	Paula	Mme	Université Paris-Dauphine	Master MASH	MASH	59,35	2
OLMEZ	Théo	М.	Université Paris-Dauphine	Master MASH	MASH	59,35	2
FERIN	Kevin	М.	Télécom Paris & IMT Atlantique	Mastère Spécialisé <sup>®</sup> Big Data	JKVT	58,92	3
PERES	Jérémie	М.	Télécom Paris & CentraleSupélec	Mastère Spécialisé® Big Data	JKVT	58,92	3
RICHARD	Vincent	М.	Télécom Paris	Mastère Spécialisé <sup>®</sup> Big Data	JKVT	58,92	3
RIVIERE	Thomas	М.	Télécom Paris	Mastère Spécialisé® Big Data	JKVT	58,92	3
BOUDEN	Sonia	Mme	Télécom Paris	Mastère Spécialisé® Big Data	NERD	58 <i>,</i> 30	4
COCHENER	Camille	Mme	Télécom Paris	Mastère Spécialisé® Big Data	NERD	58,30	4
DAVID	Sebastien	М.	Télécom Paris & Université Paris Dauphine	Mastère Spécialisé® Big Data et Master 203	NERD	58,30	4
BELLI	Sabri	М.	Université Paris-Dauphine & AgroParisTech	Master ISI & AI	VARE	58,14	5
NGUYEN	Philippe	М.	Université Paris Dauphine & AgroParisTech	Master ISI & Al	VARE	58,14	5
BARRY	Thierno	М.	Sorbonne Université	Master données apprentissage et connaissances	TJUS	54,51	6
DIALLO	Malick Toussaint	М.	Sorbonne Université-ISUP	Master ingénieur statistique et data science	TJUS	54,51	6
LOUCAR	Khadime	М.	Sorbonne Université-ISUP	Master ingénieur statistique et data science	TJUS	54,51	6
NGREMMADJI	Mbaimou Auxence	М.	Université Paris Saclay	Master Data Science	TJUS	54,51	6

The next Hackathon will be organized online on February 5-6 2021. At the registration closure, we had 101 candidates from Centrale Lyon, Centrale Supelec, EJICOM-Senegal, ENUIS-Tunisia, ENS, ENSAE, ENSAI, ENSTAB-Tunisia, EPITA, ESSEC, HEC-Liège, IA School, IMT-Atlantique, ISUP, Polytech, Sorbonne Univ., Univ. Aix-Marseille, Univ. Nantes, Univ. Paris, Univ. Paris-Dauphine-PSL, Univ. Paris Diderot, Univ. Paris Saclay, in 41 teams.

#### 3.4. Website

The goal of the website is to become a showcase for the QMI and to encourage exchange between research and professionals by becoming for example a public library of research articles and computer code relating to quantitative management themes. Address: QMinitiative.org.

The website is a way to manage the annual conference and workshops registrations. Moreover, it is continuously updated.

Quantitative Management Initiative

Hosted within the Fondation du Risque and with the support of the Institut Louis Bachelier, the work conducted within the framework of this Research

initiative is principally carried out by teams from the University Paris-Dauphine and the ENSAE (Ecole Nationale de la statistique et de l'administration

It benefits from a partnership with LFIS.

**ABOUT QMI** 

économique).

More information

Home About QMI Research Conferences Events & Resources

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## T **VISION** SUMMIT QUAN



conference. Intended for quantitative management experts, it aims featuring both the academic and the investing world to discuss and debate the future of quantitative investing.

**QMI News & Events** 

En ligne from 2021/02/05 to 2021/02/06

13h CSDA International Conference on

Senate House, University of London from

12h CSDA International Conference on

Pisa, Italy from 2018/12/14 to 2018/12/17

2019/12/14 to 2019/12/16

Learning - 3rd Edition

2020/03/06

2019)

2018

Hackathon - Intelligence Artificielle & Machine

Hackathon - Intelligence Artificielle & Machine Learning - 2nd Edition Université Paris - Dauphine from 2020/01/04 to

Computational and Financial Econometrics (CFE

Computational and Financial Econometrics (CFE



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This research initiative aims to be a means of exchange and reflexion where research themes emerge naturally, and become the starting point of research articles in the best international journals. Read more

#### RESOURCES

The QMI aims to distribute quantitative management academic research throughout the scientific community but also towards quantitative management professionals. To this end, training (research applications) will be developed and the website will propose research articles and webinars that put that research into practice. Read more



**INFOS & REGISTRATION** 

## **Dauphine** | PSL



After 9 years, we have decided that we will change our website in 2021.

