QUANTVALLEY /FDR RESEARCH INITIATIVE

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2019 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. <u>For internal use only.</u>

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•	Olivier Rousseau, membre du Directoire et Prés. du Comité de sélection 22	des gérants au (FRR)		
•	Matthew Yandle, responsable international de la Structuration chez BNF	Paribas CIB22		
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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 University Paris-Dauphine and the ENSAE (Ecole Nationale de la statistique et de l'administration économique). It benefits from partnerships with ADDSTONES GFI and La Française Investment Solutions (LFIS).

1.1. The objectives of the QMI

In the post-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 ADDSTONES GFI and LFIS, 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 started a PhD thesis on deep lerning applied to finance. He already has several working papers related to this area of research. 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. They received a grant from Institut Europlace de Finance in 2018 to conduct that project. They also participated to a call for expression of interest by the French government (Appel à Manifestation d'intérêt) on data collection for artificial intelligence.

Finally, Serge Darolles, Gaëlle Le Fol, and her PhD Student 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 Investing » 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 2019 (see past conferences).

Finally, we organized in January 2019 our first Hackathon – AI and ML in Asset management. 42 participants/17 teams. See page 22.

Momentum risk premia

Serge Darolles is working with his 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.

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. This research has been presented at several seminars and international conferences (see Seminar and conference).

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 research has been presented at the ARN Workshop meeting organized in Florence in April 2019.

Serge Darolles, Gaëlle Le Fol and Ran Sun work with another co-author on fund flows predictions, clustering effects and overdispersion with implications on fund liquidity risk. This research has been presented at the International Finance Meeting (AFFI) as well as at the Financial Time Series workshop both in Paris in December 2018. The paper has been deeply rewritten in 2019 to consider future submissions.

Estimation risk for portfolios

Several methods are compared to jointly estimate the market risk of the returns of portfolios and evaluate the estimation risk. The comparison relies on asymptotic theory and numerical experiments.

This research, jointly conducted by Christian Francq and Jean-Michel Zakoian, has been presented at several seminars and international conferences (see Seminar and conference).

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 non-linear 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.

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 was presented at the AFFI conference in Quebec and submitted to 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, 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 2020.

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).

Gaëlle Le Fol is leading a project that focuses on multivariate models to analyse the liquidity structure of a large panel of assets. Serge Darolles, Béatrice Sagna – PhD student under Gaëlle Le Fol's supervision and Christian Brownlees from Pompeu Fabra are part of that project. Fabrice Riva is for his part, with two co-authors, working on ETF liquidity (See Working papers).

In their project "Stock Market Liquidity and Trading Costs of Asset Pricing Anomalies", Tamara Nefedova, with some coauthors, 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. This topic is also at the origin of the research conducted by Charles Chevalier and Serge Darolles in a new paper dealing with the implementation cost of a trading strategy. They show that results of Trading Cost Analysis (TCA)

can be highly influenced by the strategy that are implemented. In particular, they use the example of a real trend following strategies to get some unexpected results on the impact of market volatility on trading costs.

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.

Past research showed that investors are acting strategically – by slicing their orders - to avoid being picked-off by HFTs. Doing so, they slow down the propagation of information in the prices. Again, this research has been presented several times in international conferences (see <u>Annual report 2017</u>).

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.

Albert Menkveld and Vincent van Kervel are working on HFT leaning with or against the wind of large institutional orders. They find that HFTs initially lean against these orders but eventually change direction and take position in the same direction for the most informed institutional orders. This research was initially funded by the 2013 QMI call for project and is published in the Journal of Finance (see <u>Annual Report 2013</u>, and Published papers page 17).

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).

1.3. The QMI's organization

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

Christian Gouriéroux, Professor, Université de Toronto

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 d'ADDSTONES-GFI : Pascale Gimet-Joussier

Representing La Française IS : Sofiène Haj-Taieb

Representing l'ENSAE ParisTech : Didier Janci

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)

The secretariat_

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C. Gouriéroux, Toronto University



S. Darolles, Université Paris - Dauphine



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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



A. Bécam, PhD Student, Université Paris-Dauphine



H. Chan PhD Student, Université Paris - Dauphine



O. Couperier, PhD student, CREST-ENSAE



E. Benhamou, PhD Student, Université Paris-Dauphine



C. Chevalier PhD Student, Université Paris - Dauphine



S. Fries, PhD Student, ENSAE-Paristech & CREST



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



B. Sagna, PhD Student, Université Paris-Dauphine



J. Royer, PhD Student, CREST-ENSAE



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

The QMI's associate researchers_



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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



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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: 2019
- 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 grant.

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

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.

Boloorforoosh, A., P. Christoffersen, M. Fournier, and C. Gouriéroux, Beta Risk in the Cross-Section of Equities, Working paper, Review of Financial Studies R&R.

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

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., Sagna, B. (2019), "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.

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 G. Mero, Timing the Size Risk Premia, 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.

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

Fays, B., G. Hübner, and M. Lambert, "Factoring Characteristics into Returns: A Clinical Approach to Fama-French Portfolio Decomposition", Working paper.

Fays, B., M. Lambert, and N. Papageorgiou, "Smart Equity Investing: Implementing Risk Optimization Techniques on Strategic Beta Portfolios". Working paper.

Fays, B., M. Lambert, and N. Papageorgiou, "Looking for the Tangent Portfolio: Risk Optimization Techniques on Equity Style Buckets". 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.

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

Gourieroux, C., Hencic, A., and J., Jasiak, Forecast Performance and Bubble Analysis in Noncausal MAR (1,1) Processes, R&R, Journal of Forecasting.

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, Long Term Care and Longevity, R&R, 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>.

Haas M. D., M. Khapo and M. A. Zoican, Speed and Learning in High-Frequency Auctions, Working Paper and SSRN 2738071, Revise and Resubmit at Journal of Financial Markets.

Khomyn M., T. J. Putniņš and M. Zoican, The Value of ETF Liquidity, Working Paper.

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.

Martineau C. and M. Zoican, Crowded Analyst Coverage. Working Paper and SSRN 3376162.

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.

Mero G, Measuring Hedge Fund Performances: A Markov Regime Switching with False Discoveries Approach, Working Paper.

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

Nefedova T., and G. Pratobevera, Do Institutions Play Hide-and-Sell in the IPO Aftermarket ?, Working Paper, Revise and Resubmit at the Journal of Corporate Finance.

Satiel D. and E. Benhamou, Sélection efficace de variables par montée par coordonnée avec garanties théoriques, Working Paper.

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., T-statistic for Autoregressive process, Journal of Statistical and Econometric Methods, vol.8, no.1, 43-67.

Benhamou E., J. Atif, R. Laraki, A short note on the operator norm upper bound for sub-Gaussian tailed random matrices, arxiv.org/pdf/1812.09618.

Benhamou E., J. Atif, R. Laraki, D. Saltiel, NGO-GM: Natural Gradient Optimization for Graphical Models, arXiv preprint arXiv:1905.05444.

Benhamou E., D. Saltiel, B. Guez, N. Paris, BCMA-ES II: Revisiting Bayesian CMA-ES, arxiv.org/pdf/1904.01466.

Benhamou E., D. Saltiel, S. Verel, F. Teytaud, BCMA-ES: A Bayesian approach to CMA-ES, arXiv preprint **arXiv:1904.0140**.

Boloorforoosh, A., Christoffersen, P., Fournier, M., and C., Gourieroux, Beta Risk in the Cross-Section of Stocks and Options, forthcoming **Review of Financial Studies**.

Brière, C.-A. Lehalle, T. Nefedova and A. Raboun, "Stock Market Liquidity and the Trading Costs Factors", Proceedings of the International Conference on Fintech & Financial Data Science, September 2019, University College Dublin (UCD), Ireland, Forthcoming as a Book Chapter in "Machine Learning and Asset Management".

Calamia A., Deville L. and F. Riva , "Liquidity provision in ETF markets: The basket and beyond", 2019, **Finance**, vol.40 n°1, 58-85.

Cerovecki, C., Hörmann S., Francq, C. and J.M. Zakoïan, Functional GARCH models: the quasi-likelihood approach and its applications, **Journal of Econometrics**, 209, 353-375.

Chevalier C. and S. Darolles, Trends everywhere? The case of hedge fund styles, **Journal of Asset Management**, 20 (6), 442-468.

Darolles S., G. Le Fol, Y. Lu and R. Sun, Liquidity Risk and Investor Behavior: Issues, Data and Models, Journal of Mutlivariate Analysis, 173, 181-203.

Deville L. and F. Riva, ETF : l'illusion de la liquidité, Xerfi Canal, 31 mai 2019.

Deville L. and F. Riva, Innovation financière et recherche en finance, Xerfi Canal, 14 juin 2019.

Deville L. et F. Riva, Innovation financière et recherche en finance : le cas des Exchange-Traded Funds, 2019, forthcoming in Revue Française de Gestion.

Eisele A., T. Nefedova, G. Parise, and K. Peijnenburg, Trading out of Sight: An Analysis of Cross Trading in Mutual Fund Families, forthcoming in Journal of Financial Economics.

Florens, J.P., Gourieroux, C., and A. Monfort, Model Risk Management : Limits and Future of Bayesian Approaches, Annals of Economics and Statistics, 136, 1-26.

Francq, C. and J.M. Zakoïan, Virtual Historical Simulation for estimating the conditional VaR of large portfolios, forthcoming **Journal of Econometrics**.

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

Francq, C., and J.M. Zakoïan, GARCH Models: Structure, Statistical Inference and Financial Applications, 2nd Edition, Wiley, 504 pages.

Fries, S. and J.M. Zakoïan, Mixed Causal-Noncausal AR Processes and the Modelling of Explosive Bubbles, **Econometric Theory**, 35, 1234-1270.

Gagliardini, P., and C., Gourieroux, Identification by Laplace Transforms in Panel or Time Series Models with Unobserved Stochastic Dynamic Effects, **Journal of Econometrics**, 208, 613-637.

Gagliardini, P., Gourieroux, C., and M., Rubin, Positional Portfolio Management, forthcoming, Journal of Financial **Econometrics**.

Gourieroux, C., and J., Jasiak, Robust Tests of the Martingale Hypothesis, forthcoming in **Econometrics and Statistics**, (2019)a, 9, 17-41.

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2.2. Call for projects

- Date: January 2019
- Themes: Quantitative Management

The two selected projects are:

- 1. Asset pricing with endogenous beta, <u>Costas Xiouros</u>, Associate Professor and <u>Paul Ehling</u>, Porfessor at BI Norwegian Business School, Norway.
- 2. Forecasting portfolio Weigths, Hugues Langlois, Associate Professor at HEC

The goal of this call for projects is to finance four types of publications with different research timescales. The QMI committee requested submissions of high-quality theoretical or empirical research projects on topics including (but not necessarily limited to) the following:

- 1) Artificial Intelligence
- 2) Risk and crowding
- 3) Implementation challenges

The 2 above projects have been selected out of 21 propositions listed below.

The call for project was distributed on a large number of international sites, which enabled our research initiative to be better known via:

- The Journal of Finance website
- The Financial Economics Network's Professional Announcements network
- The l'ILB, and la Fondation du Risque network

The QMI aimed to finance two projects (10 000 euros per projet).

21 projects were received from 20 prestigious international institutions such as : Ben Gurion University, Bl Norwegian Business School, City University of Hong Kong, Ecole Polytechnique Federale de Lausanne, Georgetown University, HEC Paris, Illinois Institute of Technology, Imperial College Business School, New York University, Ohio State University, Swiss Finance Institute, Universidade Catolica Portuguesa, University if Trento, University of Florence, University of Illinois at Chicago, University of Maryland, University of Massachussets, University of New South Wales, University of Southern California, University of Warwick. The projects were:

- 1. Asset Pricing with Endogenous β
- 2. Break Risk
- 3. Best Short
- 4. Equilibrium Asset Pricing with Long Term Buy and Hold Investors
- 5. Factor Investing: Hierarchical Ensemble Learning
- 6. Forecasting Portfolio Weights
- 7. Frequency-domain forecasting inputs for Dynamic Asset Allocation

- 8. How one of the largest sources of savings in Europe life insurance euro contracts implements risk sharing across investor cohorts
- 9. Implications of regret theory for mean-variance investors and for cross-sectional pricing of individual stocks.
- 10. Informational Efficiency, Mispricing and Risk Premia in Global Currency Markets (test anomalies sur les currencies)
- 11. Mean-Reversion Risk, Autocorrelation APT, and the Autocovariance CAPM
- 12. Mutual Funds Flows and Downside Risk
- 13. Optimal Asset Allocation with Competition and Illiquid Assets (in the bond industry)
- 14. Sparse Index Tracking via the sorted `1 Norm.
- 15. Statistical and probabilistic properties of Hawkes processes and their application to the large variations of financial assets prices
- 16. The impact of news coverage on the trading behavior of a wide variety of assets
- 17. The Influence of Corporate Finance on Portfolio Management: Evidence from Insurer
- 18. The role of institutional ownership
- 19. The use of ETF by professional money managers
- 20. Twitter user sentiment effect on Asset Prices
- 21. Volatility as an Asset class

2.3. Ongoing PhD thesis, PhD defense and placement

Sarah Ain Tommar, « Trois essais en Private Equity», December 10, 2018, under the supervision of Serge Darolles. Sarah Ain Tommar is assistant professor at Neoma Business School.

Adrien Bécam, « Mesure de performance et liquidité dans l'industrie des hedge funds », December 11, 2018, under the supervision of Gaëlle Le Fol. Adrien Bécam is Quantitative risk analyst at the Banque de France.

Sébastien Fries, « Anticipative alpha-stable linear processes for time series analysis: conditional dynamics and estimation », December 4, 2018, under the supervision of Jean-Michel Zakoian. Sébastien Fries is Assistant Professor of Data Science. Vrije Universiteit Amsterdam.

Ran Sun, « Risque de liquidité dans l'univers des fonds ouverts », August 29, 2018, under the supervision of Gaëlle Le Fol. Ran Sun is looking for a job as a Quant in China.

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.

Jean-Guillaume Mémin (ongoing), under the supervision of Serge Darolles.

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. Conference and seminar participation

3.1.1. 13th CSDA International Conference (CFE 2019)

Organization of one session at the Computational and Financial Econometrics, London, December 2019 - Quantitative Asset Management, Session MAL BO2.

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

- Investor sentiment and intraday bitcoin returns, Thomas Renault, Université Paris 1 Panthéon
 Sorbonne, France
- Evidence from a horse-race on the top intra-daily forecasting models for algorithmic trading, Béatrice Sagna, Université Paris - Dauphine, Member of QMI
- The earnings-announcement-day news puzzle, Nicolas Moreno, HEC Liège, Belgium.

3.1.2. Seminar and conference participations

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

"A Self-Exciting Model for Mutual Fund Flows: Investor Behaviour and Liability Risk", S. Darolles, G. Le Fol, Y. Lu and R. Sun

• 36th International Conference of the French Finance Association (AFFI), June 17-19, Québec, Canada.

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

• Northern Finance Association Conference, September 13-15, Vancouver, Canada.

"Bivariate integer-autoregressive process with an application to mutual fund flows ", S. Darolles, G. Le Fol, Y. Li, R. Sun,

- Quantitative Finance and Financial Econometrics (QFFE 2019), June 5-7, Marseille, France.
- 36th International Conference of the French Finance Association (AFFI), June 17-19, Québec, Canada.

"Bubble detection", C. Gouriéroux

• Conference on Funding Stability and Financial Regulation, December 20, Paris, France.

"Crowded Analyst Coverage", C. Martineau and M. Zoican

- 17th Paris December International Finance Meeting, December 21, Paris, France.
- Santiago Finance Workshop, December 9, Paris, France

"Dynamic Deconvolution of Independent Autoregressive Sources", C. Gouriéroux

• 36th CESG Conference, Machine Learning Econometrics, October 18-20, Montréal, Canada.

"Estimating the Conditional Value-at-Risk and Expected Shortfall", J.-M. Zakoian

• Matinales Institut Europlace de Finance - Fondation Banque de France, July 3, Paris, France.

"Estimating portfolios conditional risks in semiparametric observation-driven models", J.-M. Zakoian

• Keynote presentation, Workshop on Score-driven Time Series Models, March 27-29, Cambridge, United Kingdom.

"Evaluation of Model Risk for PD and LGD", C. Gouriéroux

- ACPR Seminar, April.
- Econometric Seminar, Toulouse.

"Forecasting Intra-daily volume in large panel", C. Brownlees, S. Darolles, G. Le Fol and B. Sagna,

- PhD seminar, Universitat Pompeu Fabra, April, Barcelona, Spain
- AMSE finance seminar, May 14, Aix-Marseille, France.
- Doctoral presentation, Université Paris Dauphine, May, Paris, France.
- Autorité des Marchés Financiers (AMF) seminar, June 25, Paris, France.
- Matinales Institut Europlace de Finance Fondation Banque de France, December 4, Paris, France.

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

 International Macroeconomics Workshop, Chaire Banque de France – Paris School of Economics, January 22, Paris, France.

"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.

"Looking for the Tangent Portfolio: Risk Optimization Techniques on Equity Style Buckets", M. Lambert.

- Brown Bag Seminar, February 21, HEC Montréal, Canada.
- Research Seminar, Paris Dauphine, February 7, Paris, France.

"Managing hedge fund liquidity risks ", S. Darolles, G. Roussellet,

- Commission Formation Recherche Af2i, March 21, Paris, France.
- ESSEC Conference on Financial Markets and Risk Management, June 26, Paris, France.

"Mixed Causal-Noncausal AR process and the modeling of bubbles", J.-M. Zakoian

• Workshop on Time Series and Extremes, May 2019, Besançon, France.

"Model Risk Management, Valuation and Governance of Pseudo Model", C. Gouriéroux

• Financial Econometrics Conference, May 15-16, Toulouse.

"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.

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

• Workshop ANR Multirisk 2019, April 28, Florence, Italy.

"Timing the size risk premium", S. Darolles, G. Le Fol, G. Mero,

• 5th Inter-Business Schools Finance Seminar Business School Conference, April 11-12, Reims, France.

"The impact of the Identification of GSIBS on Their Business Model", C. Gourieroux, A. Monfort, S. Mouabbi, and J.P. Renne

• Regulation and Systemic Risk, House of Finance Days, Dauphine University, March 21, Paris, France.

"Virtual Historical Simulation for estimating the conditional VaR of large portfolios", C. Francq and J.-M. Zakoian

- Econometrics, Finance and Statistics Workshop, January 3-5, Santiago, Chile.
- 8th Italian Congress of Econometrics and Empirical Economics (ICEEE), January 24-26, Lecce, Italy.

3.2. 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.

Date, location: March 2019 (Paris)

• Themes: Quantitative Management

The QuantValley/Quantitative Management Initiative (QMI)'s first objective is to favor synergies between quantitative management firms, academia and market authorities in order to achieve excellence in research. To optimize the cooperation between professionals and researchers, the initiative organizes workshops and conferences with the support of its academic partners, Université Paris-Dauphine and ENSAE- the French National School of Statistics and Administration. The first QuantValley/QMI Annual Research Conference will explore and present new findings on the following topics: Statistical Signal Processing, Market Liquidity, High Frequency Trading, Contagion and Systemic Risk, Risk Parity, and more generally all subjects dealing with Portfolio and Risk Management.

Venue :

Université Paris – Dauphine Place du Maréchal de Lattre de Tassigny, 75016 Paris



Le retour de la volatilité: asphyxie ou nouveau souffle



Université Paris-Dauphine, March 21, 2019

Volatility had made a noticeable comeback in 2018 and specifically in February, October and December 2018. These surges in volatility created panic among some investors and have been opportunities for others. We then wonder whether the return to volatility is good or bad, and for whom. After a year 2017 where asset returns and their volatility were particularly low, is this a return to "normal", an epiphenomenon or a change of regime forerunner of an upcoming crisis? After defining volatility, we will detail its determinants and find out if they have changed before discussing the consequences for investor strategies.

Chairman: Sophie Rolland (Journalist, Les Echos)

- Arié Assayag, fondateur et P-DG de Trajectoire Capital,
- Alain Durré, économiste en chef chez Goldman Sachs France,
- Olivier Rousseau, membre du Directoire et Prés. du Comité de sélection des gérants au (FRR¹)
- Matthew Yandle, responsable international de la Structuration chez BNP Paribas CIB.

Hackathon

We organized on January 25-26, 2019, the first Hackathon - Intelligence Artificielle & Machine Learning

This event was organized by QMI, led by research teams of Université Paris Dauphine, ENSAE and the support of ADDSTONES-GFI and LFIS. The second edition will be organized in April 2020.

42 candidates/18 teams composed of students, young graduates, researchers and engineers, 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.

PRENOM	NOM	FORMATION	EQUIPE	SCORE	RANG
Maxime	Lefebvre	Univ. Paris - Dauphine - Master 203	SGMS	0,801%	1
Nicolas	Leconte	Univ. Paris - Dauphine - Master 203	SGMS	0,801%	1
Mounah	Bizri	Univ. Paris - Dauphine - Master 203	SGMS	0,801%	1
Louis	Pruvot-Caprioli	ENSAE ParisTech	CAPA	5,883%	2
Ilyass	Msellek	Univ. Paris Dauphine - M1 MIDO	CAPA	5,883%	2
Mohamed-Ja	BOUCHRA	Sorbonne Université - M2 Stat Data Science	CAPA	5,883%	2
Fayçal	Bousmaha	Univ. Paris Diderot - Licence Informatique	CAPA	5,883%	2
Théo	OLMEZ	Univ. Paris - Dauphine - M2 MASH	MASH	6,047%	3
Dahiana	Riascos	Univ. Paris - Dauphine - Master 203	NARA	6,557%	4
Gaël	Savouré	Univ. Paris - Dauphine - Master 203	NARA	6,557%	4
Philippe	Nguyen	Univ. Paris Dauphine - M2 ISF	VARE	6,765%	5
Sabri	BELLI	Univ. Paris Dauphine - M2 IA	VARE	6,765%	5
Sung Hyuk	Pang	Univ. Paris Dauphine - M2 ISF	VARE	6,765%	5
Arnaud	PEIS	HEC Liège - Banking & AM	CGCL	7,190%	6
rémy	Laforêt	HEC Liège - Banking & AM	CGCL	7,190%	6
Arthur	Petitjean	HEC Liège - Digital Business	CGCL	7,190%	6

¹ Fonds de réserve pour les retraites

3.3. 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.

