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RESEARCH AREAS

Primary: Econometrics, Functional Data Analysis, Big Data Techniques.
Secondary: Financial Markets, Financial Econometrics.

Ph.D. Thesis

Title: Essays in Functional Econometrics and Financial Markets.
Thesis Supervisor: Marine Carrasco (University of Montreal, Canada).
Date of Completion: June 2020 (Expected).

EDUCATION

2014-2020 (Expected)	Ph.D. in Economics, University of Montreal, Canada.
2009-2012	Msc. in Statistics and Economics, Sub-Regional Institute of Statistics and Applied Economics (ISSEA), Cameroon.
2005-2008	Bsc. Degree in Mathematics, University of Yaoundé I, Cameroon.

CERTIFICATIONS

2019	International Certificate in Algorithmic Trading, QuantInsti.
2019	Certificate in Machine Learning Online, Stanford University.

WORKING PAPERS

"Intraday Stock Market Forecasting via Functional Time Series, 2019" (**Job Market Paper**).

"Theoretical Comparison of Functional Principal Component and Functional Partial Least Squares", with Marine Carrasco, 2019.

"Interpretable Risk Neutral Density Estimation with a Functional Linear Models", 2019.

WORKS IN PROGRESS

"Statistical Arbitrage in the Stock Market with the Partial Least Square Approach".

"Predicting the Stock Market Trend using the Functional Logistic Model".

TEACHING EXPERIENCE

Lecturer

Fall 2018-present	ECN 1260: Introduction to Econometrics (Undergraduate), University of Montreal, Canada.
Fall 2016	ECN 1040: Introduction to Microeconomics (Undergraduate), University of Montreal, Canada.

Teaching Assistant

2016 - Present	ECN 7065: Advanced Econometrics, Ph.D. Students track (Graduate), University of Montreal, Canada.
2016	ECN 7075: Quantitative Methods, PhD. Students (Graduate), University of Montreal, Canada.
2016	ECN 1160: Economic Data Analysis (Undergraduate), University of Montreal, Canada.
2016	ECN 1040: Introduction to Microeconomics (Undergraduate), University of Montreal, Canada.

2018 ECN 1050: Introduction to Macroeconomics (Undergraduate), University of Montreal, Canada.

CONFERENCES AND SEMINARS

2019 53rd Annual Conference of Canadian Economics Association (CEA), Banff, Alberta.
2019 59th Congress - Societé Canadienne de Science Economique (SCSE), Quebec, Canada.
2018 58th Congress - Societé Canadienne de Science Economique (SCSE), Montreal, Canada.
2018 CIREQ Econometrics Conference, Advanced Methods on GMM models.
2018 14th CIREQ Ph.D. Students' Conference, Montreal, Canada.
2017 13th CIREQ Ph.D. Students' Conference, Montreal, Canada.
2017 CIREQ Econometrics Conference on Inference in large-dimensional models, Montreal, Canada.
2016 CIREQ Econometrics Conference in Honor to Jean Marie Durfour, Montreal, Canada.
2015 11th Econometric Society World Congress, Montreal, Canada.

FELLOWSHIPS

2014-2019 Ph.D. Fellowship, CIREQ and Department of Economics, University of Montreal.
2014-2019 CIREQ Association Graduate Travel Grant.
2009-2012 Msc. in Statistics Fellowship, Government of Cameroon.
2009-2012 Central African Economic and Monetary Community (CEMAC) Fellowship.
2005-2008 Government of Cameroon Scholarship.

PROFESSIONAL EXPERIENCE

2012-2014 Regional Chief Officer of Economics, Ministry of Economy, Cameroon.
2013-2014 External Consultant, PNDP - World Bank, Cameroon.
2012-2013 Junior Consultant, ISSEA - World Bank, Cameroon.
June 2011 Data scientist Intern, Mobile Telephone Network (MTN), Cameroon.

Conference Organizing

2018 – 2019 Ph.D. Students weekly discussion Workshop, Montreal, Canada.

OTHERS

Volunteer

2015 11th Econometric Society World Congress, Montreal, Canada.
2015 Beer World Congress, Montreal, Canada.

Memberships

Center for Interuniversity Research and Quantitative Economics (CIREQ), Canadian Economic Association (CEA), Société Canadienne de Science Economique (SCSE), American Economic Association (AEA).

Computer skills

MATLAB, Python, R, STATA, Latex, Excel, Word and others.

ACADEMIC REFERENCES

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SUMMARY OF THE THESIS

(1) **Intraday Stock Market Forecasting via Functional Time Series (Job Market Paper)**

Abstract: This paper considers the intraday S&P 500 price values at the 1- minute frequency to construct a collection of return curves sequentially observed each day and an autoregressive model is deployed to forecast the one-day-ahead market return curve using the functional data analysis (FDA). In contrast to the standard AR(1) model where each observation is a scalar, each daily return curve is considered as one observation. This approach is practically important because it exploits the potential of high-frequency data to improve the forecast. Moreover, market participants can use this model estimation approach to tactically adjust their market timing strategy. The estimation of this model leads to an ill-posed inverse problem and a comparative analysis of four-dimension reduction methods is conducted including the Functional Tikhonov method (FT), the Functional Landweber-Fridman technique (FLF), the Functional spectral-cut (FSC), the Functional Partial Least Squares (FPLS). The convergence rate, asymptotic distribution, and a test-based strategy for the model selection are derived for the proposed methods. The Monte Carlo simulation results show the performance of the different approaches. Moreover, the empirical application shows that the FPLS method exhibits a remarkable out-of-sample R2 of 8% especially in the periods 09:30 AM - 10:30 AM and 02:30 PM - 04:00 PM within a day, that is almost 4 times the one obtained by preceding papers and this is due to its nonlinearity.

(2) **Theoretical Comparison of Functional Principal Component and Functional Partial Least Squares**

Abstract: In this paper, we consider a functional regression model where the predictor variable is a function and the target variable is a scalar. The main interest is to compare the Functional Principal Component Analysis (FPCA) and Functional Partial Least Squares (FPLS) techniques based. We derive the convergence rate of the conditional Mean Squared Prediction Error (MSPE) for both the estimation methods. We find that the regularization bias of the FPLS method is usually smaller than the one of the FPCA approach, while the estimation error with the FPLS approach is usually larger than the one of FPCA and may explode. Under some smoothness conditions of the predictor variable and the slope function, both the estimation methods reach the optimal convergence rate and in other situations, the FPLS tends to outperform the FPCA in terms of prediction. Some Monte Carlo simulation and empirical evidence on the stock market return prediction are provided to evaluate the theoretical results.

(3) **Interpretable Risk Neutral Density Estimation with a Functional Linear Model**

Abstract: Estimating the Risk neutral density (RND) has been an important topic of the financial market. This tool is useful for options pricing and to analyze the market risk sentiment. This paper considers that the RND is observed as a curve that takes its values in a very fine grid and we take advantage of the functional data analysis for the estimation purposes. This leads to a functional linear regression with a scalar response. The benefit of this approach is that it makes the estimation more straightforward and we can avoid the limitations of the basis or sieve expansion techniques usually observed in prior papers. Moreover, one can include call and put options all together in the estimation procedure. Since the estimation leads to a high dimensionality issue, the ill-posed problem literature is exploited to propose a functional version of Tikhonov and Landweber-Fridman regularization methods to estimate the RND. These approaches have the advantage to take into account the functional feature of the RND and future gain of derivatives. Another advantage is that the proposed method ensures the positivity of the RND and it makes it possible to provide easily consistency and asymptotic distributions, as well as confidence set of the estimators. We provide consistency and asymptotic normality results of the estimators. For the application, we use the S&P 500 option to estimate the RND and show the performances of the method in terms of market return predictability.