Final Meeting EU project "ABC-EU-XVA"

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At UNIPOL, Bologna,
September 29th 2022
(time flies!)

Text from ABC-EU-XVA Mid-Term Review 23/1/2020

- We are very well underway !
- All ESRs have interesting research work (see the 5-pagers); This year is exciting , ESRs will move to another country, to the industry; We have to be pragmatic! Combine academic and practical work with the PhD Thesis in mind, within three years!
- Interesting years ahead of us, with research, cooperation and Events.
- We are well on our time schedule.

European Industrial Doctorates program (EID) ABC-EU-XVA

- Academic partners
  - CWI Kees Oosterlee (→ Utrecht University)
  - TUD (→ Utrecht University) Pasquale Cirillo (→ ZHAW Switzerland)
  - UDC Carlos Vazquez Cendon
  - ULB Griselda Deelstra
  - UNIBO Andrea Pascucci
- Non-academic partners
  - ABANCA, Manuel Rodriguez, José Manuel Valiño
  - Belfius, Paul Koerber
  - Unipol Marco Di Francesco
  - Banco Santander Luca Caputo
  - RABOBANK Lech Grzelak, Tim Dijkstra
  - EY Gerd-Jan van Wiggen (→ another company)

Our ESRs, PhD candidates

- May 2019, our six ESRs were hired:
- ESR1: TUD/CWI ($\rightarrow$ UU/CWI), Luis Souto
- ESR2: CWI, Kristoffer Andersson ($\rightarrow$ PhD from UU)
- ESR3: UDC, Graziana Colonna
- ESR4: UDC, Roberta Simonella
- ESR5: ULB, Felix Wolf
- ESR6: UNIBO, Kevin Kamm
- $\Rightarrow$ ESR3 stopped August 1st 2021;
  Since Jan. 16th 2022 Mr. Davide Trevisani has been hired by UDC.

ABC-EU-XVA Research, in detail

- ESR1: At UU with ABANCA on WWR stochastic modeling (online discussion)
- ESR2: At CWI with Belfius Bank on portfolio XVA, algorithms (online discussion)
- ESR3: At UDC with EY on hybrid PDE/MC formulations (ESR3 stopped)
- ESR4: At UDC with UniPol on XVA in multi-currency collateral setting (online cooperation, later in person)
- ESR5: At ULB with Rabobank on "cheapest to deliver" CollVA, efficient computation of EE sensitivities within xVA (online coop., later in person)
- ESR6: At UNIBO with Santander unified XVA framework, rating, WWR, FTD (online coop.)

Publications ESR1

1. L.A. Souto Arias and P. Cirillo: Joint and Survival Annuity Valuation with a Bivariate Reinforcement urn process. Insurance: Mathematics and Economics 99: 174-189, July 2021,
2. L.A. Souto Arias, P. Cirillo and C.W. Oosterlee: Expectation-maximization for univariate reinforced urn processes under left-truncation and right-censoring. Submitted for publication. See `https://papers.ssrn.com/sol3/papers.cfm?abstract`$_id = 3593391$
3. L.A. Souto Arias, P. Cirillo and C.W. Oosterlee: A new self-exciting jump diffusion process for option pricing. https://arxiv.org/abs/2205.13321

Publications ESR2

1. K. Andersson, C.W. Oosterlee, A deep learning approach for of exposure profiles for high-dimensional Bermudan options. Comput. (2021) 408, 126332.
2. K. Andersson, C.W. Oosterlee, Deep learning for CVA computations of large portfolios of financial derivatives. Applied Math. Comput. (2021) 409, 126399.
3. K. Andersson, A. Andersson, C.W. Oosterlee, Convergence of a robust deep FBSDE method for stochastic control. https://arxiv.org/abs/2201.06854

Publications ESR3

1. A. Ferreiro, G. Colonna, C. Vázquez, A Multi-Level Monte-Carlo with FEM for XVA in European Options, Proceedings of ECMI2021, Springer.
2. S. Liu, G. Colonna, L.A. Grzelak, and C.W. Oosterlee, GPU acceleration of the seven-league scheme for large time step simulation of stochastic differential equations. In booklet: Mathematics: Key enabling technology for scientific machine learning; pp52-55 (2021).

Publications ESR4

1. I. Arregui, R. Simonella and C. Vázquez: Total Value Adjustment for European options in a multi-currency setting. Applied Math. and Computation, 413, 126647, 2022.
2. M. Di Francesco and R. Simonella, A Stochastic Asset-Liability Management Model for Life Insurance Companies. Financial Markets and Portfolio Management, to appear
3. R. Simonella, Carlos Vázquez. XVA in a multi-currency setting with stochastic foreign exchange rates. Submitted for publication.
4. I. Arregui, R. Simonella, C. Vázquez, Modelling and computing the total value adjustment for European derivatives in a multi-currency setting, Proceedings of ECMI2021, Springer.

Publications ESR5

1. F. L. Wolf, L. A. Grzelak and G. Deelstra: Cheapest-to-deliver collateral: a common factor approach, Quantitative Finance, 22(4); 707-723, 2022.
2. G. Deelstra, L.A. Grzelak, F.L. Wolf, Sensitivities and Hedging of the Collateral Choice Option. Accepted for publication in Int. Journal Theoretical and Applied Finance (IJTAF).

Publications ESR6

1. K. Kamm, S. Pagliarani, A. Pascucci: On the Stochastic Magnus Expansion and Its Application to SPDEs. Journal of Scientific Computing 89:56, 2021.
2. M. di Francesco and K. Kamm: How to handle negative interest rates in a CIR framework. SeMa journal, 2021.
3. M. di Francesco and K. Kamm: On the Deterministic-Shift Extended CIR Model in a Negative Interest Rate Framework. Int. J. Financial Stud. 2022, 10(2), 38.
4. K. Kamm, M. Muniz: A novel approach to rating transition modelling via Machine Learning and SDEs on Lie groups. https://arxiv.org/abs/2205.15699
5. K. Kamm: An introduction to rating triggers for collateral-inclusive XVA in an ICTMC framework. https://arxiv.org/abs/2207.03883
6. K. Kamm, S. Pagliarani, A. Pascucci: umerical solution of kinetic SPDEs via stochastic Magnus expansion. https://arxiv.org/abs/2207.09776

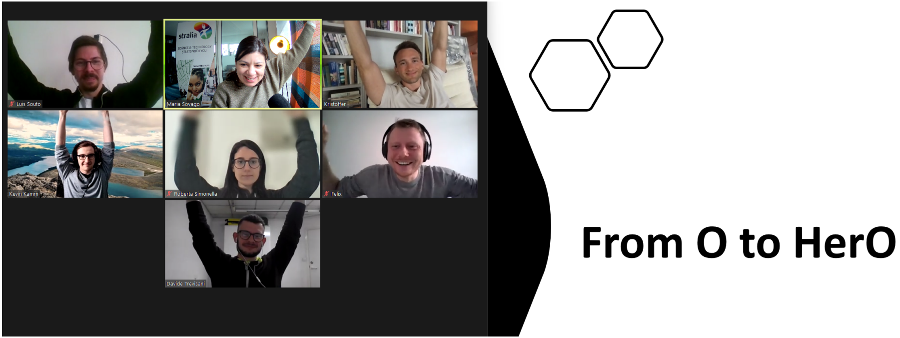
First year special events:

- February 2019: Kick-Off Meeting, Amsterdam
- May 2019: Spring school on XVA modeling, Bologna;
- July 2019: One-week Crash course on Python programming, A Coruña;
- July 2019: ICCF2019 conference in La Coruna;
- Sept. 2019: “Taking charge of your PhD”, Amsterdam (soft skills, vlog-course, plus Basel III basics);
- Jan. 2020: Winterschool in Mathematical Finance, Lunteren, NL;
- Jan. 2020: Mid-Term Review meeting in Brussels.

Special events after the Mid-Term review meeting

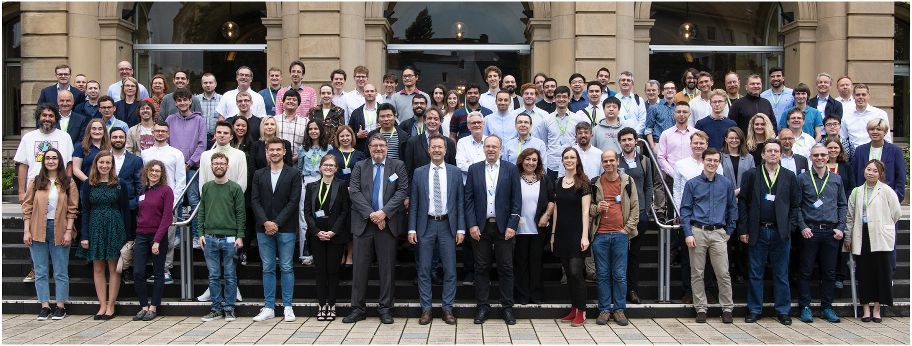
- July 2020: On-line Workshop "Machine Learning in Quantitative Finance and Risk Management", via CWI.
- January 21 and October 22, 2021: On-line ABC-EU-XVA Workshops "Mathematical Aspects of Modern Risk Management in the Financial Industry", again via zoom, with presentation by the ESRs.
- March 2022: "Shape your Career"; on-line 6x 0.5-days by Stralia, via CWI.
- April 19-22 2022: Study Week ABC-EU-XVA with the Financial Industry, La Coruña. With presentations of the ESRs, and three industry problems were introduced by Rabobank, ABANCA and True Partner Capital, see https://www.xvastudyweek.eu
- June 2022: ESR1, 2, 3b, 5 and 6 (with presentations) participated in ICCF2022 in Wuppertal, Germany. ESR2 won a prize.

“Shape Your Career”, March 2022



“Study Group with the Financial Industry”, April 2022

"ICCF 2022, Wuppertal", June 2022



Summarizing

- This was a project with pandemic obstacles;
- Still many Events organized, quite a few of them online
- Pandemic had severe impact on industrial collaboration (pragmatic approach)
- Impact on the vlogging promises (no fun to vlog from home, with lots of uncertainties)
- ESRs have been very active, and very successful with research, papers, and also with presentations and lectures.
- Extra time for ESR1,2,3b,5 from their universities
- All ESRs are well on schedule to defend their PhD Theses!

Thank you!

- To the industrial beneficiaries: for support, flexibility and patience
- To our scientific experts Laura Ballotta and Karel In't Hout: For their participation, also in online events, and for their advice.
- To the academic supervisors: For their strength, stability and confidence;
- To our EU officer: For flexibility, understanding and advice;
- To Nada Mitrovic and the CWI administration: For all the administrative aspects in the coordinator role, webpage, payments;
- To the ESRs: For their perseverance, patience, academic growth and strength and their academic curiosity!