

Curriculum Vitae

ANTONINO ZANETTE

Dipartimento di Scienze Economiche e Statistiche.
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Education

- 1991 LAUREA IN SCIENZE DELL'INFORMAZIONE, University of Udine.
- 1995 D.E.A. MASTER PROBABILITES ET FINANCES.
University of Paris VI (France).
- 1996 DOTTORATO DI RICERCA IN MATEMATICA APPLICATA ALL'ECONOMIA.
University of Trieste.
- 1998 POST-DOTTORATO DI RICERCA IN MATEMATICA APPLICATA
ALL'ECONOMIA. University of Trieste.

Employment

- 2000-2010 ASSISTANT PROFESSOR, Faculty of Economics University
of Udine.
- 2011 ASSOCIATE PROFESSOR, Department of Economics and Statis-
tics, University of Udine.
- 2017 National habilitation for Full Professor in Mathematics for Eco-
nomics, Sector 13/D4.
- 2023 Full Professor, Department of Economics and Statistics, Univer-
sity of Udine.

Activity Research

My activity research lie in Computational Finance. The main topics are :

- Tree methods for Exotic American options, insurance derivatives in
Black-Scholes, stochastic volatility and jumps models. Variables An-
nuities.

- Finite Difference Methods for pricing American options on two stocks, American lookback options, Swing options..
- Monte Carlo Methods for Pricing and Hedging American Option in High Dimension. Machine Learning for finance and insurance.

List of Publications

Publications in refereed journals

1. **S.Villeneuve A.Zanette 2002** *Parabolic A.D.I. methods for pricing American options on two stocks.*
MATHEMATICS OF OPERATIONS RESEARCH VOL.27 FEBRUARY (2002),
PP.121-149.
2. **A.Ern S.Villeneuve A.Zanette 2004** *Adaptive Finite-Element-Methods for Local Volatility European Option Pricing.*
INTERNATIONAL JOURNAL OF APPLIED AND THEORETICAL FINANCE
Vol.7 Number 6 September (2004).
3. **V.Bally L.Caramellino A.Zanette 2005** *Pricing and Hedging American Options by Monte Carlo Methods using a Malliavin Calculus Approach.*
MONTE CARLO METHODS AND APPLICATIONS Vol.11 Number 2,
(2005), pp.97-133.
4. **V.Bally L.Caramellino A.Zanette 2006** *A Mixed PDE-Monte Carlo Approach for Pricing Credit Default Index Swaptions.*
DECISIONS IN ECONOMICS AND FINANCE, 29, (2006), PP. 121-137.
5. **B.Jourdain A.Zanette 2008** *A Moments and Strike Matching Binomial Algorithm for Pricing American Put Options.*
DECISIONS IN ECONOMICS AND FINANCE, 31 (2008), no. 1, 33-49.
6. **F.Pressacco M.Gaudenzi L.Ziani A.Zanette 2008** *New insights on testing the efficiency of methods of pricing and hedging American options.*
EUROPEAN JOURNAL OPERATIONAL RESEARCH 185 (2008), NO. 1,
235-254.
7. **M.Gaudenzi A.Zanette A 2009** *Pricing American barrier options with discrete dividends by binomial trees.*
DECISIONS IN ECONOMICS AND FINANCE 32 (2009), no. 2, 129-148.
8. **M.Costabile M.Gaudenzi I.Massabó A. Zanette 2009** *Evaluating fair premiums of equity-linked policies with surrender option in a bivariate model.*
INSURANCE: MATHEMATICS AND ECONOMICS 45 (2009), no. 2, 286-295.

9. **M.Gaudenzi M.A.Lepellere A.Zanette 2010** *The Singular Points method for Pricing American Path-Dependent Options.*
JOURNAL OF COMPUTATIONAL FINANCE 14 (2010), NO. 1, 29-56.
10. **L.Caramellino A.Zanette 2011** *Monte Carlo Methods for Pricing and Hedging American Options in High Dimension.*
RISK AND DECISIONS ANALYSIS (2011) VOL. 2, P. 207-220.
11. **M.Gaudenzi A.Zanette 2011** *Pricing cliquet options by tree methods.*
COMPUTATIONAL MANAGEMENT SCIENCE (2011) NO. 8, 125-135.
12. **O.Kudryavtsev A. Zanette 2013** *Efficient pricing of Swing options in Levy-driven models.*
QUANTITATIVE FINANCE (2013), VOL. 13, NO. 4, 627-635.
13. **X.Wei M.Gaudenzi A.Zanette 2013** *Pricing Ratchet equity-indexed annuities with early surrender risk in a CIR++ model.*
NORTH AMERICAN ACTUARIAL JOURNAL (2013). VOL.17, ISSUE 3, 229-252.
14. **E.Appolloni M.Gaudenzi A.Zanette 2014** *An Efficient Binomial Lattice Method for Step Double Barrier Options.*
INTERNATIONAL JOURNAL OF APPLIED AND THEORETICAL FINANCE (2014). VOL.17, ISSUE NO. 6, 1-26.
15. **E.Appolloni L.Caramellino A.Zanette 2015** *A robust tree method for pricing American options with the Cox-Ingersoll-Ross interest rate model.*
IMA JOURNAL OF MANAGEMENT MATHEMATICS (2015) VOL.26, ISSUE NO. 4, 377-401.
16. **L.Goudenege A.Molent A.Zanette 2016** *Pricing and Hedging GLWB in the Heston and in the Black-Scholes with Stochastic Interest Rate Models.*
INSURANCE: MATHEMATICS AND ECONOMICS (2016), VOL. 70, SEPTEMBER 2016, 38-57
17. **M.Gaudenzi A.Zanette 2017** *Fast binomial procedures for pricing Parisian/ParAsian options.*
COMPUTATIONAL MANAGEMENT SCIENCE (2017), VOL.14, ISSUE 3, 313-331

18. **M.Briani L.Caramellino A.Zanette 2017** *A hybrid approach for the implementation of the Heston model.*
IMA JOURNAL OF MANAGEMENT MATHEMATICS, VOLUME 28, ISSUE 4, 1 OCTOBER 2017, 467—500
19. **M.Briani L.Caramellino A.Zanette 2017** *A hybrid tree/finite-difference approach for Heston-Hull-White type models.*
JOURNAL OF COMPUTATIONAL FINANCE, VOLUME 21, NUMBER 3, DECEMBER 2017, 1—45
20. **L.Goudenege A.Molent X.Wei A.Zanette 2018.** *Fourier-Cosine Method for Pricing and Hedging Insurance Derivatives.*
THEORETICAL ECONOMICS LETTERS, VOL. 8 (3), 2162-2078
21. **L.Goudenege A.Molent A.Zanette 2019** *Pricing and Hedging GMWB in the Heston and in the Black-Scholes with Stochastic Interest Rate Models.*
COMPUTATIONAL MANAGEMENT SCIENCE, VOLUME 16, ISSUE 1-2, 217–248
22. **M.Briani L.Caramellino G.Terenzi A.Zanette 2019** *Numerical stability of a hybrid method for pricing options.*
INTERNATIONAL JOURNAL OF APPLIED AND THEORETICAL FINANCE, VOL.22, ISSUE No. 7, 1-46.
23. **L.Goudenege A.Molent A.Zanette 2020** *Machine Learning for Pricing American Options in High-Dimensional Markovian and non-Markovian models.*
QUANTITATIVE FINANCE, VOL. 20, No. 4, 573-591.
24. **L.Goudenege A.Molent A.Zanette 2020** *Computing Credit Valuation Adjustment solving coupled PIDE in the Bates model.*
COMPUTATIONAL MANAGEMENT SCIENCE, VOLUME 17, ISSUE 2, 163–178
25. **L.Goudenege A.Molent A.Zanette 2021** *Gaussian Process Regression for Pricing Variable Annuities with Stochastic Volatility and Interest Rate.*
DECISIONS ECONOMICS AND FINANCE, VOLUME 44, ISSUE 1, 57–72
26. **L.Goudenege A.Molent A.Zanette 2022** *Moving average options: Machine Learning and Gauss-Hermite quadrature for a double non-Markovian problem*

EUROPEAN JOURNAL OF OPERATIONAL RESEARCH, VOLUME 303,
ISSUE 2, 958–974

Publications in refereed books

27. **J.Lelong A.Zanette 2010** *Tree methods in Finance.*
ENCYCLOPEDIA OF QUANTITATIVE FINANCE, 1829-1835 WILEY.
28. **O.Kudryavtsev A.Zanette 2016** *Efficient pricing of Swing options
in Levy-driven models.*
IN COMMODITIES EDITED BY M. A. H. DEMPSTER AND K. TANG,
CHAPMAN AND HALL/CRC 2016 CHAPTER 28 607-621.
29. **L.Goudenege A.Molent A.Zanette 2021** *Variance Reduction Ap-
plied to Machine Learning for Pricing Bermudan/American Options
in High Dimension*
IN APPLICATIONS OF LEVY PROCESSES EDITED BY O. KUDRYAVT-
SEV AND A. ZANETTE, NOVA SCIENCE PUBLISHERS, INC NEW YORK
CHAPTER 1 1-32.

Publications in electronic journals

30. **A.Sulem A.Zanette 2009** *Premia: A Numerical Platform for Pric-
ing Financial Derivatives.*
ERCIM NEWS [HTTP://WWW.ERCIM.ORG](http://www.ercim.org) July 2009.
31. **C.Martini A.Zanette 1999** *Premia: An Option Pricing Project .*
ERCIM NEWS [HTTP://WWW.ERCIM.ORG](http://www.ercim.org) n.38 July 1999

Research programs

- Member from 2004 to now of the INRIA MathRisk project (INRIA, University of Paris-Est). Head A.Sulem. This project follow in 2012 to MathFI INRIA project.
[HTTPS://TEAM.INRIA.FR/MATHRISK/TEAM-MEMBERS/](https://TEAM.INRIA.FR/MATHRISK/TEAM-MEMBERS/)
- Scientific leader from 1998 to now of the software project Premia of the MathFi-MathRisk project (WWW.PREMIA.FR).
PREMIA is a computational platform designed to set up a technology watch for numerical problems related to the evaluation of financial derivative products and the management of pertinent risks. It is developed by the MATHRISK research team which gathers researchers in probability and mathematical finance from INRIA Paris-Rocquencourt and the University of Paris-Est.
- Participant 2011-2012 Collegio Dottorato ASSICURAZIONE E FINANZA: MATEMATICA E GESTIONE Università degli Studi di TRIESTE. Cicli: XXVII, XXVIII
- Participant 2013-2016 Collegio Dottorato SCIENZE MANAGERIALI E ATTUARIALI Università degli Studi di Udine. Cicli: XXIX, XXX, XXXI
- Participant 2020-now Collegio Dottorato in Scienze Matematiche e Fisiche Università degli Studi di Udine. Cicli: XXVI, XXXVII.
- Participant 2002-04 PRIN 40% financed by MIU, Head Prof. Massimo De Felice.
- Participant 2007-09 PRIN 40% financed by MIUR, Head Prof. Flavio Pressacco.
- 2015 Invited as Foreign Expert to China Institute for Actuarial Science, Central University of Finance and Economics Beijing China. Project “Stochastic analysis in pricing and risk-management of equity-linked insurance products”.
- 2017 Invited as Foreign Expert to China Institute for Actuarial Science, Central University of Finance and Economics Beijing China. Project “Innovation on Risk Analysis and Decision Theory in Insurance”.

PhD and Master students supervision

- 2016 Andrea Molent “Pricing and Hedging GLWB and GMWB in the Heston and in the Black-Scholes with Stochastic Interest Rate Models.” Phd in Assicurazione e Finanza : Matematica e Gestione, University of Trieste.
- Supervision of 11 Master thesis in the Department of Economics and Statistics of University of Udine

Other informations

- Referee activity on the following journals: Applied Mathematics and Computation, Decision Economics Finance, Journal of Computational Finance, Journal of Mathematical Analysis and Applications, Mathematical Finance, Mathematical Methods of Operation Research, Quantitative Finance, Scandinavian Actuarial Journal, SIAM Journal on Financial, Insurance: Mathematics and Economics.

Teaching

- **2004-to now** 50/72 hours. Mathematical Finance, **in 2year Master program of Faculty of Economics, University of Udine.**
- **2004-2019** 36/48 hours. Numerical Methods in Finance-Laboratory for Financial Engineering, **in 5year Master program of Faculty of Economics, University of Udine.**
- **2020-to now** 72 hours. Misurazioni Quantitative per l'Impresa.**in 5year Master program of Faculty of Economics, University of Udine.**
- **2008** 4 hours. Monte Carlo Methods and Application of Malliavin Calculus Techniques. **Corso di Alta Formazione in Finanza Matematica, Bologna.**
- **2011** 9 hours. Numerical Probabilistic methods in Finance. **Financial mathematics Doctoral program, Politecnico di Milano.**
- **2011-2014** 5 hours. Tree methods in Finance (in Methodes deterministe in Finance cours of prof.Lelievre). **Master program Ecole Nationale des Ponts et Chaussés, Champs-sur-Marne, France.**
- **2012 and 2014** 60 hours (30 hours lectures and 30 hours tutorials and labs). Financial mathematics 2. **Master in Financial Mathematics. Faculty of Mathematics and Physics, University of Ljubljana. Slovenia.**
- **2018, 2020, 2022** 60 hours (30 hours lectures and 30 hours tutorials and labs). Numerical methods in finance. **Master in Financial Mathematics. Faculty of Mathematics and Physics, University of Ljubljana. Slovenia.**

Talks in Conference

- *Parabolic A.D.I. methods for pricing American options on two stocks* **1999 International Conference on Mathematical Finance Hammamet.**
- *Comparison of finite difference methods for pricing American options on two stocks* **AMASES 2001 Firenze.**
- *Adaptive Finite-Element-Methods for Local Volatility European Option Pricing* **AMASES 2002 Verona, AMAM 2003 Nice.**
- *Pricing and Hedging American Options by Monte Carlo methods using a Malliavin calculus approach* **AMASES 2003 Cagliari, Giornata di Studio “Metodi Numerici in Finanza” 2003 Venezia, CEPET 2003 Summer Workshop Udine, MC2QMC 2004 conferences Juan Le Pins France.**
- *Monte Carlo Methods for Pricing and Hedging American Options in High Dimension* **AMASES Modena 2004.**
- *A Moments and Strike Matching Binomial Algorithm for Pricing American Put Options* **AMASES Palermo 2005, Italian-Spanish Conference of Mathematical Finance Verbania 2005.**
- *A Mixed PDE-Monte Carlo Approach for Pricing Credit Default Index Swaptions* **Stochastics Methods in Finance, Rome 2005, Poster Session in Conference “New Mathematical Methods in Risk Theory” in honour of H.Buhlman Firenze 2005, Bachelier Conference Tokio August 2006.**
- *The Singular Points Binomial Method for pricing American path-dependent options* **Second AMaMeF Conference. Advanced Mathematical Methods for Finance, 2007 Bedlewo(Poland).**
- *On a second order numerical scheme for computing exercise regions of American lookback options* **AMS Conference Joint Mathematics Meetings San Diego, CA, January 6-9, 2008, (Presented by S.Villeneuve), AMASES Trieste 2006.**
- *Pricing Cliquet options by tree methods* **5th International Conference in Computational Management Science, Imperial College London 2008.**

- *Pricing American barrier options with discrete dividends by binomial trees.* **AMASES Trento 2008**, Numerical methods in Finance Udine 2008 (Presented by M.Gaudenzi).
- *Evaluating fair premiums of equity-linked policies with surrender option in a bivariate model.* **Third conference on Numerical methods in Finance ENCP Paris 2009**, **IME Conference Istanbul 2009**, **AMASES Parma 2009**.
- *Premia : An Option Pricing project.* **INTERNATIONAL CONFERENCE ON APPLIED STATISTICS AND FINANCIAL MATHEMATICS.** The Hong Kong Polytechnic University 2010.
- *Pricing Ratchet equity-indexed annuities with early surrender risk in a CIR++ model.* **IME Conference Trieste 2011**.
- *Tree methods for pricing exotic options.* **Invited Speaker XIII Iberian-Italian Congress of Financial and Actuarial Mathematics Cividale del Friuli 2012**.
- *A hybrid tree-finite difference approach for the Heston model.* **Accepted talk at 8th World Congress of the Bachelier Finance Society Bruxelles 2014**
- *Pricing and Hedging GLWB in the Heston and Black-Scholes with stochastic interest rates models.* **Insurance: Mathematics and Economics (IME) Liverpool 2015 (Presented by L.Goudenege).**
- *Hybrid tree-finite difference methods for the Heston, Bates and Heston Hull-White models.* **Accepted talk at International Conference of Computational Finance (ICCF) University of Greenwich 2015**, **SIMAI Politecnico di Milano 2016**, **8th AMAMEF Amsterdam 2017**, **CMS Bergamo 2017**, **Amases Cagliari 2017**, **MAF Conference Madrid 2018**.
- *Computing Credit Valuation Adjustment using hybrid approaches in the Bates model.* **CMS Trondheim, Norway, 2018 (Presented by L.Goudenege)**, **Amases Napoli 2018**, **Symposium On Quantitative Finance and Risk Analysis, Kos 2019**.
- *Gaussian Process Regression for Pricing Variable Annuities with Stochastic Volatility and Interest Rate* **AFIR ERM, Firenze, 2019**

- *Machine Learning for Pricing American Options in High Dimension.* **Vienna Congress on Mathematical Finance 2019, SIAM Conference on Financial Mathematics and Engineering - Happening Virtually 2021**
- *Moving average options: Machine Learning and Gauss-Hermite quadrature for a double non-Markovian problem.* **9th International Conference on Risk Analysis, Perugia 2022, ECSO-CMS 2022, Venezia, Commodity and Energy Markets Association Annual Conference Budapest 2023.**