

8. ACTUARIAL SCIENCE & MATHEMATICAL FINANCE

Programmeme director: Prof. dr. ir. M.H. Vellekoop
 METIS code: uva/feb/ase/act
 JEL-classification: C, G2
 Starting date: 1989
 Website: www.aseri.uva.nl/act

8.1 MEMBERS OF THE RESEARCH GROUP AND RESEARCH IN FTES

<i>Name</i>	<i>Title</i>	<i>Function</i>	<i>Total 2013</i>	<i>Total 2014</i>	<i>Total 2015</i>	<i>Funding</i>
Antonio, K.	dr.	ud	0,60	0,38	0,10	1
Berkum, F. van	msc	phd	0,32	0,32	0,32	3
Bilsen, S. van	dr.	ud	-	-	0,08	1
Bilsen, S. van	dr.	ud	-	-	0,10	3
Boonen, T.	dr.	ud	-	-	0,25	1
Boonen, T.	dr.	ud	0,17	0,00	0,25	3
Can, U.	dr.	postdoc	0,33	-	-	3
Can, U.	dr.	postdoc	0,29	0,50	-	1
Can, U.	dr.	ud	-	-	0,50	1
Cui, J.	dr.	ud	0,23	-	-	3
Doff, R.R.	dr.	guest	-	0,00	0,00	1
Engel, K.	msc	guest	-	0,00	0,00	1
Fan, Z.	msc	phd	0,80	0,80	0,80	3
Gastel, L. van	dr.	ud	0,08	0,11	0,11	3
Goovaerts, M.J.	prof. dr.	guest	0,00	0,00	0,00	1
Hooijmsma, J.	msc	phd	0,13	0,40	0,40	3
Janssen, M.J.J.	drs.	guest	0,00	0,00	0,00	1
Kaas, R.	prof. dr.	hgl	0,42	0,42	-	1
Kaas, R.	prof. dr.	guest	-	-	0,00	1
Kloek, T.G.	msc	guest	-	-	0,00	1
Kort, J. de	msc	phd	0,40	0,40	0,40	3
Kuné, J.B.	prof. dr.	guest	0,00	0,00	0,00	1
Laeven, R.	prof. dr.	hgl	0,80	0,80	0,70	3
Lalu, A.	msc	phd	0,27	0,80	0,40	1
Li, M.	msc	phd	-	-	0,27	1
Linders, D.	dr.	postdoc	-	-	0,12	3
Petrov, M.	msc	guest	-	0,00	0,00	1
Plat, H.J.	drs.	guest	0,00	0,00	-	1
Ronner, A.E.	prof. dr.	bijz. hgl	0,10	0,10	0,10	1
Vellekoop, M.	prof. dr.	hgl	0,35	0,35	0,35	1
Vellekoop, M.	prof. dr.	hgl	0,30	0,30	0,30	3

<i>Name</i>	<i>Title</i>	<i>Function</i>	<i>Total 2013</i>	<i>Total 2014</i>	<i>Total 2015</i>	<i>Funding</i>
Yang, X.	dr.	postdoc	-	0,27	0,53	3
Yue, Y.	msc	phd	-	0,27	0,80	3
Total 1st flow of funds			1,43	2,17	2,05	
Total 2nd flow of funds			1,40	1,18	0,00	
Total 3rd flow of funds			2,76	2,87	4,83	
Total 1st f.o.f. excl. PhD's			1,16	1,37	1,38	
Total 1st-3rd flow of funds			5,59	6,22	6,88	
PhD students			1,92	3,39	3,39	

8.2 PROGRAMME DESIGN

The programme concerns both fundamental and applied research in the field of financial institutions. It is mainly directed at insurance companies (for life, non-life, pension and social insurance), but also at banks and other financial intermediaries. Research is performed on the mathematical modeling, estimation, appraisal and control of financial risks of such financial institutions under complete and incomplete information and for complete and incomplete markets. For long term insurance contracts, especially pensions, saving by insurance is significant, which leads to the study of optimal investment and consumption problems. An increasingly important aspect is the influence of the "risk of longevity" on the policies of life insurance, social insurance and care insurance. Newly reported statistics show that life expectancy continues to rise faster than predicted both in the Netherlands and abroad, and the modeling of this effect and its consequences for life insurance policies and pension contracts therefore remains an important area of investigation. Present-day challenges for non-life insurance contracts include decreasing profit margins, increasing competition and selective behaviour of the insured and of insurance companies. In social insurance, there are specific problems that emerge from the privatisation of social insurance contracts. Apart from studying problems in the separate fields of life, non-life, pension and social insurance, work is also done on the theoretical research subject which concerns the unification of several distinct actuarial theories in these fields, and their connection with stochastic financial mathematics.

Supervision and regulation of insurance companies and pension funds form an important part of the field of actuarial research. Methods for risk measurement and the determination of solvency requirements have come under intensified scrutiny in the wake of the recent financial crisis. The new European regulatory framework Solvency II for insurers and the Dutch FTK regulation for pension funds lead to many important new research questions. The Actuarial Science group therefore works on the further development of actuarial risk theory, in particular the development of new mathematical and economic models in the fields of market-consistent valuation, market-consistent pricing and market-consistent embedded value for insurance portfolios.

Other significant fields of research are the interaction between credibility theory, models for the estimation of unreported claims (IBNR) and actuarial ordering of risks, and their consequences for the determination of insurance premiums (risk classification). Credibility models can be viewed as Generalized Linear Mixed Models, having both random (subject-specific) and fixed effects in the linear predictor. Generalized Linear Models and Generalized Linear Mixed Models can be used for a variety of actuarial statistical problems like survival modelling, graduation, multiple-state models, loss distributions, risk classification, premium rating and claims reserving in non-life-insurance. Other aspects are the homogeneity and heterogeneity of insurance portfolios, the probabilistic and subsidising solidarity imposed on the insured, the voluntary or compulsory character of the insurance, and the auto-selection and anti-selection of those insured.

8.3 PROGRAMME EVALUATION

The growth of the research group Actuarial Science has continued in 2014 with the arrival of a new postdoc, Xiye Yang, and a new PhD student, Yuan Yue. Xiye works on the asymptotic properties of estimators which use high frequency asset price data to estimate continuous and discrete leverage effects in asset returns, and on statistical tests which detect self-excitation in jumps. In this context self-excitation means that a jump in asset prices may increase the probability of a new jump directly afterwards, a phenomenon that could help explain the clustering of jumps which is observed in certain financial time series. Yuan will work on fraud detection in insurance claims in cooperation with the PhD project's sponsor, Van Ameyde International bv. Before taking up this project in insurance she has successfully worked on models for pension funds as well, as witnessed by the prize that was awarded to her by Netspar, the Network for Studies on Pensions, Ageing and Retirement. She received this prize for the MSc thesis *Measuring the Cost of Regulatory Funding Ratio Constraints for Defined Benefit Pension Plans* which she wrote as the result of an internship at APG.

Another prize was awarded to Roger Laeven and his co-authors from the University of Tilburg, Servaas van Bilsen and Theo Nijman. They received the prestigious Australian Securities Exchange (ASX) Best Quantitative Paper Prize for their paper 'Consumption and Portfolio Choice under Loss Aversion and Endogenous Updating of the Reference Level' at the Australasian Banking and Finance Conference which was held in December in Sydney.

Two members of the group, Katrien Antonio and Michel Vellekoop, participated in a large applied research project which led to new stochastic mortality models for the Netherlands and Belgium which are now the default choice for actuarial calculations in life insurance contracts for both countries. Research was done in cooperation with the Dutch Actuarial Society (het Koninklijk Actuarieel Genootschap), the Belgian Actuarial Society (IA|BE), several representatives from Dutch insurance companies and pension funds and colleagues from the University of Tilburg.

International contacts have been strengthened during research visits at the School of Mathematics, Statistics & Operations Research at Victoria University of Wellington (Umut Can) and the Business School of Imperial College in London (Tim Boonen). In the Netherlands we have organised working group meetings for the Netspar research theme *Risk Management for Funded Pension Systems* and another successful installment of the by now traditional autumn symposium for the Dutch Association of Insurers (het Verbond van Verzekeraars). This year, the event was organized jointly with ACRM (the Amsterdam Center of Excellence in Risk and Macro Finance), the new research priority area of the faculty. The group actively participates in this center, which aims to develop more insight into recessions, financial crises and systemic risk by using integrated methodologies from different disciplines. During a successful ACRM workshop *Micro Foundations for Macro Finance* in August, more than 30 people participated in a series of structured brainstorm session, seeking the frontiers of the current methodological debate on micro models for financial intermediaries.

Strengths: New tenure tracks and a number of part-time positions have strengthened the research profile of the group. We therefore expect to continue to play an important role in the national and international research networks which study problems in actuarial science and mathematical finance.

Weaknesses: The group has many junior researchers and only a few senior researchers and there are relatively many part-time positions in the group.

Opportunities: Research in the group comprises some traditional actuarial subjects but also looks at the interplay between finance and insurance which has received increased attention since the beginning of the financial crisis. This allows the group to play a growing role in *Macro Finance Risk*, the new research priority area in the faculty.

Threats: The increased number of Master students for both Executive and regular programmes has led to an increase in the number of theses that have to be supervised by the staff. This leads to increasing pressure on the time available for research.

8.4 RESOURCES AND FUNDING

Below are several Research grants awarded to members of the group:

01/2010 – 01/2014. VIDI grant (NWO Vernieuwingsimpuls/Innovational Research Incentives Scheme) ‘Econometrics of Contagion in Insurance and Finance’, prof. dr.R.J.A. Laeven, €800.000.

01/2013 – 12/2015. Netspar theme grant: Risk Management for Funded Pension Schemes, theme coordinator: prof. M.H. Vellekoop, €500.000.

01/2012 – 01/2015. Chair ‘Verzekeringseconomie’ sponsored by Verbond van Verzekeraars (Dutch Association of Insurers), €400.000.

01/2012 – 01/2015. Sponsored PhD Research Grant, APG (Position of Zhenzhen Fan, extended).

2013. Sponsored PhD Research Grant, Van Ameyde (Position of Yuan Yue).

2013. EDEEM PhD Research Grant, jointly with Universidade Nova de Lisboa (Position of Marko Petrov).

8.5 OUTPUT

Key publications

Aït-Sahalia, Yacine, Julio A. Cacho-Diaz & Roger J. A. Laeven (2015). Modeling financial contagion using mutually exciting jump processes, *Journal of Financial Economics* 117, 585-606.

T.J. Boonen (2016). Nash equilibria of Over-The-Counter bargaining for insurance risk redistributions: the role of a regulator. *European Journal of Operational Research*, 250 (3), 955-965.

Can, S. Umut, John H. J. Einmahl, Estate V. Khmaladze & Roger J. A. Laeven (2015). Asymptotically distribution-free goodness-of-fit testing for tail copulas, *Annals of Statistics* 43, 878-902.

F. van Berkum, K. Antonio & M. Vellekoop (2015). The impact of multiple structural changes on mortality predictions. *Scandinavian Actuarial Journal*.

Forthcoming

R. Verbelen, K. Antonio & G. Claeskens (2016). Multivariate mixtures of Erlangs for density estimation under censoring. *Lifetime Data Analysis*, accepted for publication.

Publications in numbers

Output type	Classification	#
Articles in journals	Refereed	13
	Non-refereed	0
	Professional	1
	Popular	0
Books or book chapters	Refereed	1
	Non-refereed	0
	Professional	0
	Popular	0
Conference proceedings		0
PhD theses		1
Working papers		2

Article in journal – refereed

- Antonio, K., Bardoutsos, A. & Ouburg, W. (2015). Bayesian Poisson log-bilinear models for mortality projections with multiple populations. *European Actuarial Journal*, 5 (2), 245-281.
- Aït-Sahalia, Y., Cacho-Diaz, J. & Laeven, R.J.A. (2015). Modeling financial contagion using mutually exciting jump processes. *Journal of Financial Economics*, 117 (3), 585-606.
- Berkum, F. van, Antonio, K. & Vellekoop, M. (2015). The impact of multiple structural changes on mortality predictions. *Scandinavian Actuarial Journal*.
- Boonen, T.J. (2015). Competitive equilibria with distortion risk measures. *ASTIN Bulletin*, 45 (3), 703-728.
- Can, S.U., Einmahl, J.H.J., Khmaladze, E.V. & Laeven, R.J.A. (2015). Asymptotically distribution-free goodness-of-fit testing for tail copulas. *The Annals of Statistics*, 43 (2), 878-902.
- Dhaene, J., Stassen, B., Devolder, P. & Vellekoop, M. (2015). The minimal entropy martingale measure in a market of traded financial and actuarial risks. *Journal of Computational and Applied Mathematics*, 282, 111-133.
- Eeckhoudt, L. & Laeven, R.J.A. (2015). The probability premium: A graphical representation. *Economics Letters*, 136, 39-41.
- Godecharle, E. & Antonio, K. (2015). Reserving by conditioning on markers of individual claims: a case study using historical simulation. *North American Actuarial Journal*, 19 (4), 273-288.
- Ikefuji, M., Laeven, R.J.A., Magnus, J.R. & Muris, C. (2015). Expected utility and catastrophic consumption risk. *Insurance: Mathematics & Economics*, 64, 306-312.
- Kaas, R., Gerber, H., Goovaerts, M., Shiu, E. & Albrecher, H. (2015). The impact factor of IME. *Insurance: Mathematics & Economics*, 62, 1-4.
- Kort, J. de & Vellekoop, M.H. (2015). Term structure extrapolation and asymptotic forward rates. *Insurance: Mathematics & Economics*.
- Verbelen, R., Gong, L., Antonio, K., Badescu, A. & Lin, S. (2015). Fitting mixtures of Erlangs to censored and truncated data using the EM algorithm. *ASTIN Bulletin*, 45 (3), 729-758.
- Verbelen, R., Antonio, K. & Claeskens, G. (2015). Multivariate mixtures of Erlangs for density estimation under censoring. *Lifetime Data Analysis*.

Article in journal – professional

- Can, S.U. & Laeven, R.J.A. (2015). Determining the right tail dependence model using R. *Actuaris*, Mei 2015.

Book / book chapter – refereed

Charpentier, A. & Kaas, R. (2015). Introduction. In A. Charpentier (Ed.), *Computational actuarial science with R* (Chapman & Hall/CRC The R Series) (pp. 1-72). Boca Raton: CRC Press.

Report – professional

Antonio, K. & Devriendt, S. (2015). Lang leven in België: een nieuwe prognose. (Leuvense Economische Standpunten, no LES 2015/151). Leuven: KU Leuven.

Boonen, T. & Waegenaere, A. de (2015). Boekhoudkundige regelgeving voor bedrijfspensioenfondsen: van IAS 19 naar IAS 19R. (Netspar Economische Adviezen (NEA Paper), no 59). Tilburg: Netspar.

Working- or discussion paper

Berkum, F. van, Antonio, K. & Vellekoop, M. (2015). A Bayesian joint model for population and portfolio-specific mortality. (Netspar Discussion Paper Series, no DP 11/2015-034). Tilburg: Netspar.

Boonen, T., Tan, K.S. & Zhuang, S.C. (2015). Optimal reinsurance with one insurer and multiple reinsurers. Amsterdam: University of Amsterdam.

UvA dissertation – internally prepared

Yang, X. (2015, Juni 16). Essays on high frequency financial econometrics. Universiteit van Amsterdam (vi, 182 pag.) (Amsterdam: Tinbergen Institute). Prom./coprom.: prof.dr. H.P. Boswijk & prof.dr. R.J.A. Laeven.

Conference organiser

Antonio K. (2015). Member of the scientific committee of ASTIN 2015, Sydney, Australia.

Antonio K., Laeven, R. and Vellekoop, M.H. (2015). Member of the program committee of Rob and R in insurance Conference, University of Amsterdam, June 29-30, 2015.

Antonio K. and Vellekoop, M.H. (2015). Member of the jury of the Econometric Game, the world championship of Econometrics, Amsterdam.

Laeven, Roger J. A.: Organizer of an ACIS-ACRM Mini Symposium on Solvency and Financial Stability, Koninklijk Instituut voor de Tropen, Amsterdam, November 6, 2015.

Recognition

Laeven, Roger J. A.: Nominated for the New Scientist Science Talent 2015.

Laeven, Roger J. A.: Van Ameyde-UvA PhD Research Grant: Economic and Statistical Aspects of Insurance Fraud. [EUR 150,000]

Laeven, Roger J. A.: APG-UvA PhD Research Grant: Contagion and Portfolio Choice. [EUR 103,000]

Laeven, Roger J. A.: Sponsorship Chair of Risk and Insurance by the Dutch Association of Insurers. [EUR 480,000]

Vellekoop, M.H.: Netspar Theme Grant 2013-2016 (project leader). [EUR 500,000]

Vellekoop, M.H.: EDEEM Research Grant for PhD student Marko Petrov (jointly with Universidade Nova de Lisboa) . [± EUR 150,000]

Media appearance

Bilsen, S. (2015). Interview ‘gedragseconomie als leidraad voor je pensioen’, BNR Nieuwsradio, 03/11/2015. <http://www.bnr.nl/radio/bnr-spitsuur/wetenschap-vandaag/563842-1511/gedragseconomie-als-leidraad-voor-je-pensioen>

Laeven, Roger J. A.: Interview in De Actuaris on Science and Practice, March 2015.

- Laeven, Roger J. A.: Interview in Eureka on Solvency II, April 2015.
- Laeven, Roger J. A.: Interview in Het Parool on Financial Contagion, August 26, 2015.
- Laeven, Roger J. A.: Interview in Het Financieele Dagblad on Actuarial Science Education, September 19, 2015.

Keynote/invited talk

- Antonio K. (2015). Micro-level stochastic loss reserving for general insurance: a multi-state approach with flexible payment distributions. Talk in the Econometric challenges in risk management (host: prof. Laura Spierdijk, RUG) at CFE/ERCIM 2015, University College London (UK), December 12, 2015.
- Antonio K. (2015). Micro-level stochastic loss reserving for general insurance: a multi-state approach with flexible payment distributions. Ageas CE workshop on reserving in general insurance, Brussels, December 9, 2015.
- Antonio K. (2015). Micro-level stochastic loss reserving for general insurance: a multi-state approach with flexible payment distributions. (host: prof. H.J. Albrecher) Université de Lausanne, Lausanne, Switzerland, October 31, 2015.
- Antonio K. (2015). Bayesian Poisson log-bilinear models for mortality projections with multiple populations. Quantact research seminar, UQAM, Montreal, August 3, 2015.
- Antonio K. (2015). Micro-level loss reserving. Seminar series in mathematical statistics, Stockholm University, Sweden, May 27, 2015.
- Antonio K. (2015). The AG2014 and IA|BE 2015 mortality projection models. Guest lecture at RUG (host: prof. Laura Spierdijk), Groningen, March 18, 2015.
- Antonio K. (2015). The IA|BE 2015 mortality projection model. Mortality forum IA|BE, Brussels, February 26, 2015.
- Boonen, T.J. (2015, March 10). Risk sharing with Dual Utilities. University of Waterloo (host: Ken Seng Tan).
- Boonen, T.J. (2015, March 15). Risk sharing with Dual Utilities. Georgia State University (host: Daniel Bauer).
- Can, S.U. (2015, September 8). Asymptotically distribution-free goodness-of-fit testing for tail copulas. Invited talk in the International Conference on Probability Theory and Statistics (host: Estate V. Khmaladze), I. Javakhishvili Tbilisi State University, Georgia.
- Can, S.U. (2015, November 12). Asymptotically distribution-free goodness-of-fit testing for tail copulas. Invited talk in the Joint Statistics Seminar (host: Irène Gijbels), KU Leuven, Belgium.
- Fan, Z (2015, July, 7). Asymmetric excitation and the US Bias (host: Dr. Juri Hinz) at European Meeting of Statistics 2015, Vrije Universiteit, Amsterdam.
- Laeven, Roger J. A.: November 19, 2015. Modeling Systemic Risk, Invited Speaker, KULeuven, Leuven, Belgium.
- Laeven, Roger J. A.: November 6, 2015. Solvency and Financial Stability, Invited Speaker, Koninklijk Instituut voor de Tropen, Amsterdam, The Netherlands.
- Laeven, Roger J. A.: September 6-12, 2015. Return Measures of Risk, Invited Speaker, International Conference on Probability Theory and Statistics, Tbilisi, Georgia.
- Laeven, Roger J. A.: May 26-29 2015. Robust Optimal Stopping, Invited Speaker, Models and Numerics in Financial Mathematics, Lorentz Center, Leiden, The Netherlands.
- Lalu, A. (2015, January 27). Asset returns with self-exciting jumps: option pricing and time-varying jump risk premia. *Special invited lecture at 14th Winter School on Mathematical Finance, Congrescentrum De Werelt, Lunteren, NL.*
- Vellekoop, M.H. (2015, March 24). On Incomplete Markets. Invited talk, University of Udine. Udine, Italy.
- Vellekoop, M.H. (2015, august 20). Show me the measure! *Invited Talk ABN AMRO Quants Knowledge Sharing Seminar*, Amsterdam.
- Vellekoop, M.H. (2015, dec) Term Structure Extrapolation and Asymptotic Forward Rates. Invited Talk, *Conference on Computational and Financial Econometrics.*

Other lectures

- Antonio K. (2015). A Bayesian joint model for population and portfolio specific mortality. Brown bag seminar, KU Leuven, December 3, 2015.
- Berkum, F. van (2015, 13 January). Bayesian portfolio-specific mortality. PARTY2015 Workshop, Liverpool, UK.
- Berkum, F. van (2015, 25 June). Bayesian portfolio-specific mortality. IME 2015, Liverpool, UK.
- Berkum, F. van (2015, 7 September). Bayesian portfolio-specific mortality. Longevity11 Conference, Lyon, France.
- Berkum, F. van (2015, 1 October). Bayesian portfolio-specific mortality. Netspar Pension Day, Utrecht, the Netherlands. Laeven, Roger J. A.: November 12-13, 2015. Return Measures of Risk, Workshop on Dependence & Risk Measures, University of Milano-Bicocca, Milano, Italy.
- Boonen, T.J. (2015, December 10). Netspar meeting. Solvency II with Expected Shortfall. University of Amsterdam.
- Laeven, Roger J. A.: August 4, 2015. Prudence, temperance and other virtues: The dual story, Invited Speaker, WRIEC, Munich, Germany.
- Laeven, Roger J. A.: June 24-26, 2015. Return Measures of Risk, 19th International Congress on Insurance: Mathematics and Economics, Liverpool, UK.
- Laeven, Roger J. A.: June 24-26, 2015. On the Esscher-Girsanov Transform, 19th International Congress on Insurance: Mathematics and Economics, Liverpool, UK.
- Lalu, A. (2015, May 29). Asset returns with self-exciting jumps: option pricing and estimation with a continuum of moments. Proposed contribution to DYNSTOCH Network Conference 2015, Lund University, Lund, SWE.
- Lalu, A. (2015, June 2). Asset returns with self-exciting jumps: option pricing and estimation with a continuum of moments. Short presentation during SoFiE Spring School, Brussels National Bank, Brussels, BE.
- Lalu, A. (2015, June 13). Asset returns with self-exciting jumps: option pricing and estimation with a continuum of moments. Poster presentation at Netherlands Econometrics Study Group Meeting, Maastricht University, Maastricht, NL.
- Lalu, A. (2015, June 26). Asset returns with self-exciting jumps: option pricing and estimation with a continuum of moments. Invited lecture at 8th Annual SoFiE Conference, Aarhus University, Aarhus, DK.
- Lalu, A. (2015, July 9). Asset returns with self-exciting jumps: option pricing and estimation with a continuum of moments. Contributed talk at European Meeting of Statisticians 2015, VU University Amsterdam, Amsterdam, NL.

Membership academies

- Laeven, Roger J. A.: Promotor (with Prof. H. P. Boswijk) of Xiye Yang, University of Amsterdam, June 16, 2015.
- Laeven, Roger J. A.: Promotor (with Prof. T. E. Nijman and Prof. A. L. Bovenberg) of Servaas van Bilsen, Tilburg University, November 4, 2015.
- Vellekoop, M.H.: Membership Phd Committee of Sally Chen (June 22, 2015, University of Maastricht, promotores: prof. A. Pelsser and prof. P. Schotman)
- Vellekoop, M.H. Membership Phd Committee of Xiye Yang (June 16, 2015, University of Amsterdam, promotores: prof. H.P. Boswijk and prof. R. Laeven)
- Vellekoop, M.H. Membership Phd Committee of Ben Stassen (KU Leuven, August 31, 2015; promotor: prof. J. Dhaene)

Editorship

- Antonio, A. (2015). *European Actuarial Journal*. Member of the Editorial Board
- Kaas, R.. (2014). *Insurance: Mathematics and Economics*. Managing editor.
- Laeven, Roger J.A.: *Dependence Modelling*, Associate Editor.

Laeven, Roger J. A.: *Insurance Markets and Companies: Analyses and Actuarial Computations*, Associate Editor.

Laeven, Roger J. A.: *Insurance: Mathematics and Economics*, Associate Editor.

Relevant position

Laeven, Roger J. A.: Visiting Professor at the Bendheim Center for Finance, Princeton University, US, August 2015.

Laeven, Roger J. A.: Co-Director of the Research Focal Area of Risk and Macro Finance at the University of Amsterdam.

Laeven, Roger J. A.: Advisor and Co-Director of the Multivariate Risk Modeling Group, Eurandom, the European Institute for Statistics, Probability, Stochastic Operations Research and Its Applications, Eindhoven, The Netherlands.

Laeven, Roger J. A.: Fellow and Director of the Insurance Supervision Research Program of the Amsterdam Centre for Insurance Studies (ACIS).

Laeven, Roger J. A.: Extramural Fellow of CentER.

Laeven, Roger J. A.: Fellow of the cluster Stochastics --- Theoretical and Applied Research (STAR).

Boonen, T., Laeven, Roger J. A & Vellekoop, M.H.: Fellow of the Network for Studies on Pensions, Aging and Retirement (Netspar).

Vellekoop, M.H. (2015) Member of the Commission on Mortality Research, Koninklijk Actuarieel Genootschap.