

Milan van den Heuvel

Curriculum Vitae

Campus Tweekerken
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Belgium

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Data Science - Statistics - Complex Systems - Causality - Socioeconomics

Postdoctoral research fellow with a joint Ph.D. Physics and Economics. Expertise in advanced statistical processing and analysis of data from an econometrics as well as a data science point-of-view to extract actionable insights.

Experienced in project management, goal tracking, and communication in multidisciplinary teams from both industry and academia.

Interested in designing and applying causality and machine learning inspired methodology to find relevant answer that empower people/companies/government to make the right decisions.

Current position

2020–now **Economist in Residence**,
Center of Excellence A&AI,
BNP Paribas Fortis, Belgium.

Together with Prof. Koen Schoors, I started and manage a long-term collaborative project between Ghent University and BNP Paribas Fortis bank. Our goal is to construct “Models for a Changing world” with which we push the state-of-the-art in societal and banking relevant economic research.

2019–now **Post-Doctoral Researcher**,
Department of Economics,
Ghent University.

My personal research focuses on identifying and quantifying causal links in data to better inform decisions on socioeconomic challenges. To this end, I co-lead the Advanced Data Science team at Ghent University.

Peer-Reviewed Papers

- 2022 **Financial wealth and early income mobility**,
Humanities and Social Sciences Communications,
with Tarik Roukny (KU Leuven), Jan Ryckebusch (UGent), and Koen Schoors (UGent).
- 2022 **Network control by a constrained external agent as a continuous optimization problem**,
Scientific Reports,
with Jannes Nys (University of Antwerp) Bruno Merlevede (UGent), and Koen Schoors (UGent).
- 2019 **Loan maturity aggregation in interbank lending networks obscures mesoscale structure and economic functions**,
Scientific Reports,
with Marnix Van Soom (VUB, UGent), Jan Ryckebusch (UGent), and Koen Schoors (UGent).

- 2018 **Social Stability and Extended Social Balance-Quantifying the Role of Inactive Links in Social Networks**,
Physica A: Statistical Mechanics and its Applications,
with Andres M. Belaza (UGent), Kevin Hoefman (UGent), Jan Ryckebusch (UGent), Aaron Bramson (RIKEN, UGent, UNC Charlotte), Koen Schoors (UGent, HSE), Corneel Casert (UGent), and Benjamin Vandermarliere (UGent).
- 2017 **Statistical Physics of Balance Theory**,
PLoS one, 12(8): e0183696,
with Andres M. Belaza (UGent), Kevin Hoefman (UGent), Jan Ryckebusch (UGent), Aaron Bramson (RIKEN, UGent, UNC Charlotte), and Koen Schoors (UGent, HSE).

Ongoing work

- Repayment behaviour prediction for mortgage loans using dynamic survival analysis**,
ongoing,
with Marijn De Kerpel.
- Causality-preservation capabilities in data replication methods: an overview**,
ongoing,
with Yves-Cedric Bauwelinckx (KU Leuven), Tim Verdonck (University of Antwerp, KU Leuven), Jan Dhaene (KU Leuven).
- Decomposing the consumption response to income changes**,
ongoing,
with Johannes Weytjens (UGent), Kris Boudt (UGent, VUB), and Koen Schoors (UGent).
- A finger on the pulse: GDP nowcasting with transaction level banking data.**,
ongoing,
with Feliciaan De Palmaer (UGent, VUB), Arno De Block (UGent, VUB), Kris Boudt (UGent, VUB), and Koen Schoors (UGent).
- Liquid wealth heterogeneity, asymmetric consumption dynamics, and myopic loss aversion**,
Working Paper,
with Koen Schoors (UGent).

Other Published Work

- 2017 **Measuring Propagation with Temporal Webs**,
Temporal network epidemiology, 57-104, Book chapter,
with Aaron Bramson (RIKEN, UGent, UNC Charlotte), Kevin Hoefman (UGent), Benjamin Vandermarliere (UGent), and Koen Schoors (UGent, HSE).

Education

2015–2019 **Ph.D. Physics and Economics,**
Thesis: Addressing socioeconomic challenges with micro-level trace data,
Department of Economics, Department of Physics and Astronomy,
Ghent University.

I was part of a research group that conducts interdisciplinary research in the fields of socioeconomics, complex systems, and networks often combining methods from both data science, economics/econometrics, and physics.

I specialised in studying socioeconomic problems by processing and analysing data from an econometrics point-of-view as well as from a data science standpoint. I learned how to design and code pipelines to process and analyse large amounts of data with a variety of tools. I also learned how to efficiently lead a project and report progress to superiors and colleagues.

Practical skills gained from projects at this position:

I was involved in three data-driven projects:

- Using user-data on a virtual world to test, construct, and expand on theories on human behaviour (economics, sociology, political sciences)
- Using client-data from a large European bank to investigate economic behaviour as well as societal inequality dynamics.
- Using data on the Russian interbank lending market to investigate what details contain relevant information on the structures and economic functions residing in the data.

For these project, the data had to be extracted from several types of databases (SQL, HDFS (Hadoop), json/csv dumps), then thoroughly investigated and cleaned (Python, R) before it could be used for the projects (Python, R). Working environments were also diverse, from working in-house at a large European bank on a shared server, to working on a Hadoop cluster, to working on the clusters of the Flemish Supercomputer Centre. During these projects, I learned how to rapidly and efficiently gain insight into the data, refine research questions answerable with the data, manage computational complexities that come with processing huge amount of data, choosing the right tools for a problem, all while functioning in and communicating with an interdisciplinary team of researchers and employees from the collaborating firms.

Completed courses:

- Advanced Econometrics
- Advanced Microeconomics
- Advanced Macroeconomics
- Big Data Science
- Causal Inference

2013–2015 **M.Sc. Physics and Astronomy,**
Thesis: Journey through the controllability of interbank credit networks,
Magna Cum Laude,
Ghent University.

I specialised in understanding and modelling complex systems.

Completed courses:

- Multi-Agent Systems (KUL)
- Physical modelling of complex systems (KUL)
- Statistical Physics II
- Computational Physics
- Non-linear dynamics and chaos (VUB)

2013–2015 **Minor Economics and Business Administration**,
Magna Cum Laude,
Ghent University.

Completed courses:

- Economics
- Financial Markets and Institutions
- Financial Mathematics
- Business Administration
- Organisational Theory
- Marketing Management
- Entrepreneurship

2010-2013 **B.Sc. Physics and Astronomy**,
Title thesis: Plasma surface treatment of PLLA to promote hydrophilic properties,
Ghent University.

All math courses in this Bachelor are also part of the B.Sc. Mathematics and included:

- Mathematical analysis I and II
- Linear algebra and analytic geometry
- Differential geometry

Other courses and training

- 2020 **Generative Adversarial Networks (GANs)**,
[Coursera certificate](#),
DeepLearning.ai.
Online
- 2020 **Deep Learning Specialisation**,
[Coursera certificate](#),
DeepLearning.ai.
Online
- 2019 **Science to Data Science (S2DS)**,
Bootcamp,
Pivigo, London, UK.

Highly competitive training for quantitative Ph.D.'s to gain expertise in applying machine learning in real-world settings by completing a consultancy project for a company and converting data insights into value. My team completed a project on visitor conversion and revenue prediction for Made.com which resulted in a reduction of 65% in the error on customer value predictions or similarly reducing the time to obtain accurate visitor value prediction by a factor of 9. This enabled the marketing team to more efficiently spend ad budget obtaining higher Return on Ad Sales and lower Customer Acquisition costs.
- 2019 **Machine learning**,
summer school, grade A+,
London School of Economics and Political Science.
London, UK
- 2016 **Intensive Language course: French**,
Niveau B1-2,
Education First.
Centres Internationaux de Langues, Paris
- 2016 **GraphConnect workshops + private training on Neo4j graph database design**,
GraphConnect Europe + workshops,
Londen, UK.

- 2016 **Econometrics: Methods and Applications**,
[Coursera certificate](#),
Erasmus University Rotterdam.
Online
- 2016 **Complex networks: Theory, Methods, and Applications**,
Summerschool,
Lake Como School of Advanced Studies.

Short-term visits

- 2017 **Massachusetts Institute of Technology**,
Media Lab.

Research visit for a collaboration on a big data project around Social Mobility (Dr. Tarik Roukny).

Other Employment

- 2008/2010/2011 **Various positions**,
VRT (Flemish broadcasting corporation).

I participated in a projects from the VRT ("De Overname") in which I completed various internships. "De Overname" was a project organised by the VRT, which gave a select group of teens the chance to experience and execute television- and radio-programs from start to finish. I participated in a variety of workshops on graphic design, writing, sound- and movie-editing, and had several other learning experiences from shadowing professionals. **This position taught me a lot about communicating to a broad audience and the inner working of media and how dissemination of information is organised within it.**

Technical and Personal skills

- **Languages:** Proficient in: Dutch, English
Also intermediate in: French.
- **Programming/scripting Languages:** Proficient in: Python (Pandas, scikit-learn, PySpark, Hadoop in python, Dask, Graph-Tool, networkX, Statsmodel, linearmodels, etc.), R, SQL, \LaTeX , STATA, Neo4j
Also basic ability with: Google Cloud, Javascript, C++, HTML.
- **Software Skills:** Git, GitHub, Docker, MS Word and Excel (Advanced), Adobe Creative Suite: Illustrator, Photoshop, Premiere pro, Lightroom, After Effects (basic to intermediary)

References

- Available on request