

JIMMY ROYER
Principal

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Dr. Royer applies a broad range of quantitative tools to address client needs in data science, statistics, HEOR, finance, intellectual property, competition policy, and antitrust cases in the United States, Canada, and the EU. His recent work includes predicting the potential future onset of rare or undiagnosed conditions with machine learning models; predicting whether patents would be considered essential to technological standards if challenged in courts; valuing patents in the communications industry; evaluating damages related to product defects; analyzing investment guidelines in securities lending suits; addressing allegations of monopolization in major antitrust cases involving high tech firms; and supporting many academic experts on mutual fund market timing and excess fee cases. In addition, Dr. Royer has conducted extensive academic research and coauthored books and papers on topics such as using new AI advances in HEOR; predicting treatment resistance in tuberculosis; using machine learning algorithms in propensity score models; measuring the impact of ESO backdating on shareholders' wealth; analyzing mutual fund pricing; analyzing antitrust limit pricing; valuing private investments for hospitals in Canada; determining the impact of hypertension therapies on mortality; and comparing unemployment compensation in different countries.

EDUCATION

- 2003 Ph.D., Economics, Université Laval, Québec, Canada
Thesis: "Market Rigidities and Welfare Dependence Analyzed through Experiments"
Advisor: Marc Van Audenrode

- 1999 Graduate Courses in Statistics, Université Laval, Québec, Canada

- 1998 Master's in Economics, Université Laval, Québec, Canada

- 1997 Baccalaureate in Economics, Université Laval, Québec, Canada
Dean's honor list for three consecutive years

PROFESSIONAL EXPERIENCE

- 2000–Present Analysis Group, Inc. (Montréal)
Principal (2018–Present)
Vice President (2006–2018)
Senior Economist (2001–2006)
Economist (2000–2001)

- 2003–Present Université de Sherbrooke (Québec)
Adjunct Professor of Economics

- 1999–2014 Université de Sherbrooke (Québec)
Lecturer: Teaching of undergraduate economics courses on a periodic basis

- 1999–2000 Université Laval (Québec)
Lecturer: Teaching of undergraduate economics courses

SOFTWARE EXPERTISE

Python, R, SAS, Mathematica, Matlab, C, CUDA-C, Fortran, Java, JavaScript, HTML, Julia, SQL, MPI

SELECTED CASE WORK

Data Science and Machine Learning

- Co-hosted workshops on opportunities for using generative AI in real-world research.
- Performed attribute predictions and patent valuations in the communications industry using decision trees, deep neural networks, support vector machines, and ensembled algorithms.
- Developed graphics processing unit (GPU) parallelization tools and packages for various applications.
- Applied machine learning algorithms to systematic literature reviews.
- Predicted health outcomes using machine learning models applied to large claims datasets.

Intellectual Property

- *Apple v. Samsung cases*
Analyzed survey data and performed analyses on conjoint data in support of affiliate experts retained to address Apple's analysis of consumer purchase decisions related to smartphone features claimed in the context of sales of infringing Samsung smartphones and tablets.
- *United States Superior Court of the State of California for the City and County of San Francisco Microsoft I-V*
Supported affiliate experts in developing a damages model in a case involving alleged non-competitive practices.
- *Ortho-McNeil Pharmaceutical, Inc. v. Watson Laboratories, Sandoz, Inc. and Lupin Pharmaceuticals, Inc. and Lupin Ltd., and. Barr Laboratories, Inc*
Performed and supervised clinical trial data and patent analyses related to patent infringement claims in a dispute associated with generic entry of oral contraceptives.

Labor Economics

- **Tom Brady's suspension appeal**
Reviewed the statistical analyses in the Wells Report and supported Professor Edward Snyder's testimony at the appeal hearing for Tom Brady's four-game suspension.
- *Conférence des juges du Québec & al. c. Procureur général du Québec No. 500-05-070351-026 et Morton S. Minc & al. c. Procureur général du Québec No. 500-05-070457-021*
Performed assessment of fair compensation for Québec provincial judges.

Finance

- *Twitter, Inc. v. Elon Musk, et al.*
Supported an expert in Twitter's widely publicized litigation filed against Elon Musk for attempting to terminate his \$44 billion acquisition of Twitter. Led the team that analyzed the reasonableness of Twitter's processes and approaches to eliminating false and spam accounts and estimating the number

of false and spam accounts that remained. Rebutted the opposing expert's estimates of the volume of false and spam accounts using machine learning models.

- **Residential mortgage-backed securities (RMBS) cases**

Analyzed and modeled loan-level RMBS data to calculate the impact of various loan-level characteristics on future cash flows and tranche valuation in cases involving allegations of breach of fiduciary duty and misrepresentation.

- **Securities lending**

Analyzed risk and performance of securities lending strategies to support expert testimony related to allegations that investment managers did not follow investment guidelines during the 2008 financial crisis.

- **Bear Stearns**

Performed and supervised simulation models in support of Professor Glenn Hubbard's testimony showing that decisions made by hedge fund managers at Bear Stearns were consistent with model predictions given the financial information available at the time.

- **Competition and pricing in the mutual fund industry**

Analyzed competition in the mutual fund industry and managements fees in support of experts retained to provide consulting and expert witness services on behalf of American Century and other mutual fund companies. The cases concerned allegations that these companies charged excessive management fees to their mutual funds in violation of Section 36(b) of the Investment Company Act of 1940.

SELECTED ACADEMIC RESEARCH AND PUBLICATIONS

- "Development of Predictive Models to Inform a Novel Risk Categorization Framework for Antibiotic Resistance in *E. coli*-Causing Uncomplicated Urinary Tract Infection," with Ryan K. Shields, Wendy Y. Cheng, Kalé Kponee-Shovein, Daniel Indacochea, Chi Gao, Fernando Kuwer, Ashish V. Joshi, Fanny S. Mitrani-Gold, Patrick Schwab, Diogo Ferrinho, Malena Mahendran, Lisa Pinheiro, Madison T. Preib, Jennifer Han, and Richard Colgan, submitted to *Clinical Infectious Diseases* (2023)
- "A Machine Learning Model to Predict Psoriasis Incidence Based on Neighborhood Characteristics: A Populational Study from Quebec, Canada," with Anastasiya Muntyanu, Raymond Milan, Mohammed Kaouache, Julien Ringuet, Wayne Gulliver, Irina Pivneva, Max Leroux, Kathleen Chen, Qiuyan Yu, Global Psoriasis Atlas, Christopher Griffiths, Ivan V. Litvinov, Elham Rahme, and Elena Netchiporouk, *American Journal of Clinical Dermatology* (forthcoming)
- "Difficulty Of Detecting AI Content Poses Legal Challenges," with Christopher Bail and Lisa Pinheiro, *Law360* (2023)
- "Predicting clinical remission of chronic urticaria using random survival forests: machine learning applied to real-world data," with Irina Pivneva, Maria-Magdalena Balp, Yvonne Geissbühler, Thomas Severin, Serge Smeets, James Signorovitch, Yawen Liang, Tom Cornwall, Jutong Pan, Andrii Danyliv, Sarah Jane McKenna, Alexander M. Marsland, and Weily Soong, *Dermatology and Therapy* (2022)
- "The Effect of Quebec's CEGEPs on Total Years of Schooling," with Pierre Fortin and Natalia Mishagina, *Canadian Public Policy* (2022)

- “Development and evaluation of a predictive algorithm for unsatisfactory response among patients with pulmonary arterial hypertension using health insurance claims data,” with Marjolaine Gauthier-Loiselle, Yuen Tsang, Patrick Lefebvre, Peter Agron, Karimah Bell Lynum, Lucas Bennett, and Sumeet Panjabi, *Current Medical Research and Opinion* (2022)
- “Development of a Multivariable Proxy Model for Six-Minute Walk Distance (6MWD) in Duchenne Muscular Dystrophy (DMD) Using Machine Learning Methods,” with Nicolae Done, Joel Iff, James Signorovitch, Dimitris Bertsimas, Erik Henricson, and Craig McDonald, *Neurology* (2020)
- “Beyond multidrug resistance: Leveraging rare variants with machine and statistical learning models in Mycobacterium tuberculosis resistance prediction,” with Michael L. Chen, Akshith Doddi, Luca Freschi, Marco Schito, Matthew Ezewudo, Isaac S. Kohane, Andrew Beam, and Maha Farhat, *EbioMedicine* (2019)
- “Early Predictors of Sjögren’s Syndrome: A Machine Learning Approach,” with James Signorovitch, Irina Pivneva, Wolfgang Hueber, and Gorana Capkun, *Value in Health* (2019)
- “Smart Contracts & Their Potential Tax Implications,” with Alan G. White, *Lawyer Monthly* (2018)
- “Estimating Average Treatment Effects with Propensity Scores Estimated with Four Machine Learning Procedures: Simulation Results in High Dimensional Settings and with Time to Event Outcomes,” with Kip Brown and Philip Merrigan, *SSRN* (2018)
- “Over-Declaration of Standard Essential Patents and Determinants of Essentiality,” with Marc Van Audenrode, Robin Stitzing, and Pekka Säaskilähti, *SSRN* (2017)
- “Decision-Making with Machine Learning in our Modern, Data-Rich Healthcare Industry,” with Nick Dadson and Lisa Pinheiro, chapter in *Decision Making in a World of Comparative Effectiveness Research: An End-User’s Practical Guide to Analysis and Interpretation*, Springer (2017)
- “Practical Uses for Machine Learning In Health Care Cases,” with Mihran Yenikomshian and Lisa Pinheiro, *Law360* (2016)
- “Machine-Learning Algorithms Can Help Health Care Litigation,” with Lisa Pinheiro, Nick Dadson, and Paul Greenberg, *Law360* (2016)
- *An Analysis of Investment and Drawdown Strategies over a Long Retirement Horizon*, with Michael F. Koehn, Kara Schmutte, Marc Van Audenrode, and Philippe Giguere-Duval, white paper (2014)
- “Is backdating executive stock options always costly to shareholders?” with Philippe Grégoire, R. Glenn Hubbard, Michael F. Koehn, and Marc Van Audenrode, *Accounting & Finance* (2013)
- *The Mutual Fund Industry: Competition and Investor Welfare*, with R. Glenn Hubbard, Michael F. Koehn, Stanley I. Ornstein, and Marc Van Audenrode, Columbia University Press (2010)
- “The Impact of Antihypertensive Drugs on the Number and Risk of Death, Stroke and Myocardial Infarction,” with Ernst R. Berndt, Pierre Cremieux, David Cutler, Andrée-Anne Fournier, Genia Long, and Alicia Sasser, *Health Affairs* (2007)
- “The Economic Impact of a Partnership-Measurement Model of Disease Management: Improving Cardiovascular Outcomes in Nova-Scotia (ICONS),” with Pierre Cremieux, Pierre Fortin, Marie-Claude Meilleur, and Terrence Montague, *Healthcare Quarterly* (2007)

- *Determinants of Incidence and Duration of Unemployment Spells Among Older Workers*, with Pierre Fortin and Marc Van Audenrode, report for Human Resources and Skills Development Canada (2007)
- *The Impact of the Vaccines for Children Program on Rates of Childhood Immunization*, with Louis Rossiter, Genia Long, Alicia Sasser, Andrée-Anne Fournier, and Howard Birnbaum, white paper (2005)
- *When Family Values Really Matter: A Comment on: "Family Values and the Star Phenomenon: Strategies of Mutual Fund Families,"* with Michael Koehn and Marc Van Audenrode (2005)

SELECTED POSTERS AND PRESENTATIONS

- "Prospects for Automation of Systematic Literature Reviews (SLRs) with Artificial Intelligence and Natural Language Processing," presented as a research poster at ISPOR Europe 2023 (November 2023)
- "Clinical Application and Validation of a Predictive Antimicrobial Resistance Risk Categorization Framework for Patients with Uncomplicated Urinary Tract Infection," presented as a research poster at IDWeek 2023 (October 2023)
- "Next Gen HC Data," educational symposium at the Harvard Club of New York City (October 2023)
- "Development of a Risk Categorization Framework to Quantify Antimicrobial Resistance Risk in Female Patients with Uncomplicated Urinary Tract Infection," presented as a research poster at ICPE 2023 (August 2023)
- "Development and Validation of a Predictive Algorithm to Assess the Risk for Antimicrobial Resistance Among Patients with Uncomplicated Urinary Tract Infection," presented as a research poster at ECCMID 2023 (April 2023)
- "Unlock Real-World Data with Machine Learning," educational symposium at ISPOR Europe 2022 (November 2022)
- "Predicting Antimicrobial Resistance in Uncomplicated Urinary Tract Infections Using Machine-Learning," presented as a research poster at ISPOR Europe 2022 (November 2022)
- "Factors influencing natural remission in chronic urticaria – preliminary results from a machine learning real-world study," presented as a research poster at European Academy of Allergy and Clinical Immunology (EAACI) (July 2021)
- "Predicting time to natural remission in chronic urticaria using random survival forest model," presented as a research poster at EAACI (July 2021)
- "Early Predictors of Sjögren's Syndrome: A Machine Learning Approach," presented as a research poster at ISPOR US 2019 (May 2019)
- "Advances in HEOR: New Frontiers Based on Developments in Artificial Intelligence," educational symposium at ISPOR Europe 2018 (November 2018)
- "An Application of Artificial Intelligence-Based Methodology in Literature Reviews," presented as a research poster at ISPOR Europe 2018 (November 2018)

- “Artificial Intelligence Assisted Literature Reviews: Key Considerations for Implementation in Health Care Research,” presented as a research poster at ISPOR Europe 2018 (November 2018)

PROFESSIONAL ASSOCIATIONS AND MEMBERSHIPS

2016–Present *Le Québec Économique*
Scientific committee member