

William B. Haskell

wbhaskell@gmail.com

<https://www.wbhaskell.com>

INTERESTS

- Risk management
- Large-scale dynamic programming
- Network optimization
- Simulation/data-driven optimization
- Security and counter-terrorism

EDUCATION

Ph.D. Industrial Engineering and Operations Research May 2011

University of California Berkeley

Dissertation: Aspects of optimization with increasing concave stochastic order constraints

Committee: Z. Max Shen (chair), J. George Shanthikumar, Rhonda Righter, and Venkat Anantharam

M.A. Mathematics December 2010

University of California Berkeley

Thesis: Optimization with multivariate integral stochastic order constraints

Committee: Donald Sarason (chair), Steven Evans, and Z. Max Shen

M.S. Industrial Engineering and Operations Research May 2007

University of California Berkeley

M.S. Econometrics May 2006

University of Massachusetts Amherst

Thesis: Comparative statics for robust optimal solutions

Committee: L. Joe Moffitt (chair) and John K. Stranlund

B.S. Mathematics December 2005

University of Massachusetts Amherst

EMPLOYMENT

Assistant Professor

ISEM Department, National University of Singapore

August 2014 - Present

Mathematics Department (by courtesy), National University of Singapore

October 2017 - Present

Postdoctoral Research Fellow

CS and EE Departments, University of Southern California

June 2013 - May 2014

Visiting Assistant Professor

ISE Department, University of Southern California

August 2011 - May 2013

Intern

NASA Ames Research Center

June 2010 - August 2010

Teaching Assistant

IEOR Department, University of California Berkeley

September 2009 - December 2010

Research Assistant

IEOR Department, University of California Berkeley

September 2008 - May 2011

Research Assistant

Resource Economics Department, University of Massachusetts Amherst

January 2005 - May 2006

AWARDS and HONORS

- National University of Singapore Young Investigator Award. National University of Singapore. May 2017 - April 2020.
- Berkeley Fellowship for Graduate Study. University of California Berkeley. September 2006 - May 2010.

JOURNAL ARTICLES

- J14 W. B. Haskell and A. Toriello. Modeling stochastic dominance as infinite-dimensional constraint systems via Strassen's theorem. *Journal of Optimization Theory and Applications*, Vol. 178, No. 3, Pages 726 - 742, 2018.
- J13 S. Zhao, W. B. Haskell, and M. Cardin. Decision Rule based Method for Flexible Multi-Facility Capacity Expansion Problem. *IIEE Transactions*, Vol. 50, No. 7, Pages 553 - 569, 2018.
- J12 R. Zhao, W. B. Haskell, and V. Tan. Stochastic LBFGS Revisited: Improved Convergence Rates and Practical Acceleration Strategies. *IEEE Transactions on Signal Processing*, Vol. 66, No. 5, Pages 129 - 138, 2018.
- J11 P. Yu, W. B. Haskell, and H. Xu. Approximate value iteration for risk-aware Markov decision processes. *IEEE Transactions on Automatic Control*, 2017.
- J10 G. Yu, W. B. Haskell, and Y. Liu. Resilient facility location against the risk of disruptions. *Transportation Research Part B*, Vol. 104, Pages 82 - 105, 2017.
- J9 W. B. Haskell, J. G. Shanthikumar, and Z. Shen. Primal-dual algorithms for optimization with stochastic dominance. *SIAM Journal on Optimization*, Vol. 27, No. 1, Pages 34 - 66, 2017.
- J8 W. B. Haskell, J. G. Shanthikumar, and Z. Shen. Aspects of optimization with stochastic dominance. *Annals of Operations Research*, Vol. 253, No. 1, Pages 247 - 273, 2017.
- J7 J. Woodruff, W. B. Haskell, and A. Toriello. *Optimized Financial Systems* Helps Customers Meet their Personal Finance Goals with Optimization. *Interfaces*, Vol. 46, No. 4, Pages 345 - 359, 2016.
- J6 W. B. Haskell, L. Fu, and M. Dessouky. Ambiguity in risk preferences in robust stochastic optimization. *European Journal of Operational Research*, Vol. 254, No. 1, Pages 214 - 225, 2016.
- J5 W. B. Haskell, R. Jain, and D. Kalathil. Empirical Dynamic Programming. *Mathematics of Operations Research*, Vol. 41, No. 2, Pages 402 - 429, 2016.
- J4 W. B. Haskell and R. Jain. A convex analytic approach for risk-aware Markov decision processes. *SIAM Journal on Control and Optimization*, Vol. 53, No. 3, Pages 1569 - 1598, 2015.
- J3 A. Toriello, W. B. Haskell, and M. Poremba. A dynamic traveling salesman problem with stochastic arc costs. *Operations Research*, Vol. 62, No. 5, Pages 1107 - 1125, 2014.
- J2 W. B. Haskell and R. Jain. Stochastic dominance-constrained Markov decision processes. *SIAM Journal on Control and Optimization*, Vol. 51, No. 1, Pages 273 - 303, 2013.
- J1 W. B. Haskell, J. G. Shanthikumar, and Z. Shen. Optimization with a class of multivariate integral stochastic order constraints. *Annals of Operations Research*, Vol. 206, No. 1, Pages 147 - 162, 2013.

WORKING PAPERS

- W16 W. B. Haskell, R. Jain, H. Sharma, and P. Yu. Randomized function fitting for empirical dynamic programming. *Revision in IEEE Transactions on Automatic Control*.
- W15 W. Huang and W. B. Haskell. Stochastic approximation for risk-aware Markov decision processes. *Revision in IEEE Transactions on Automatic Control*.
- W14 W. B. Haskell, W. Huang, and H. Xu. A unifying framework for multi-attribute decision-making. *Revision in Operations Research*.

- W13 H. Le, R. Zhao, and W. B. Haskell. Sequential smoothing framework for saddle-point problems with application to constrained optimization. *Submitted to SIAM Journal on Optimization on July 18, 2018.*
- W12 H. Pham and W. B. Haskell. Dynamic equations on time scales for algorithms solving unconstrained optimization problems. *Submitted to SIAM Journal on Optimization on April 11, 2018.*
- W11 J. Xu, W. B. Haskell, and Z. Ye. Index-Based Policies for Risk-Averse Multi-Armed Bandits. *Submitted to European Journal of Operational Research on June 15, 2018.*
- W10 J. Xu, W. B. Haskell, and Z. Ye. Index-Based Policies for Risk-Averse Markov Multi-Armed Bandits. *In preparation.*
- W9 Z. Chen, P. Yu, and W. B. Haskell. Distributionally Robust Optimization for Sequential Decision Making. *In preparation.*
- W8 B. Wei and W. B. Haskell. Randomized Primal-Dual Algorithms for Semi-Infinite Programming. *In preparation.*
- W7 B. Wei and W. B. Haskell. Corporative Stochastic Approximation for Constrained Optimization. *In preparation.*
- W6 J. Isohatala and W. B. Haskell. Risk-aware controlled Markov processes. *In preparation.*
- W5 J. Isohatala and W. B. Haskell. Probabilistic risk-aware control of stochastic differential equations. *In preparation.*
- W4 S. Wang, S. Ng, and W. B. Haskell. A Multi-Level Simulation Optimization Approach for Quantile Functions. *In preparation.*
- W3 H. Le and W. B. Haskell. A Distributionally Robust Network Fortification Model. *In preparation.*
- W2 W. Huang, H. Pham, and W. B. Haskell. Risk-aware Stochastic Games: Offline and Online Algorithms. *In preparation.*
- W1 S. Zhao, W. B. Haskell, and M. Cardin. An Approximate Dynamic Programming Algorithm for a Multi-stage Capacity Investment Problem. *In preparation.*

CONFERENCE PAPERS

- C19 S. Wang, S. Ng, and W. B. Haskell. Quantile Simulation Optimization with Stochastic Co-Kriging Model. *Winter Simulation Conference, 2018.*
- C18 S. Zhao, W. B. Haskell, and M. A. Cardin. An Approximate Dynamic Programming Approach for Multi-Facility Capacity Expansion Problem with Flexibility Design. *IISE Annual Conference Proceedings, 2017.*
- C17 H. Le and W. B. Haskell. Sequential smoothing framework for convex concave saddle point problems with application to large-scale constrained optimization. *Allerton Conf. on Communication, Control, and Computing, 2017.*
- C16 W. B. Haskell and R. Jain. Inexact iteration of averaged operators for non-strongly convex stochastic optimization. *Allerton Conf. on Communication, Control, and Computing, 2017.*
- C15 P. Yu, W. B. Haskell, and H. Xu. Dynamic Programming for Risk-aware Sequential Optimization. *Proc. of the IEEE Control and Decision Conf. (CDC), 2017.*
- C14 J. Isohatala and W. B. Haskell. Risk-aware semi-Markov decision processes. *Proc. of the IEEE Control and Decision Conf. (CDC), 2017.*
- C13 W. Huang and W. B. Haskell. Risk-aware Q-Learning for Markov Decision Processes. *Proc. of the IEEE Control and Decision Conf. (CDC), 2017.*
- C12 W. B. Haskell, P. Yu, R. Jain, and H. Sharma. Randomized function fitting for empirical dynamic programming. *Proc. of the IEEE Control and Decision Conf. (CDC), 2017.*
- C11 W. B. Haskell and R. Jain. A random monotone operator framework for strongly convex stochastic optimization. *Proc. of the IEEE Control and Decision Conf. (CDC), 2017.*

- C10 R. Zhao, W. B. Haskell, and V. Tan. Stochastic LBFGS Revisited: Improved Convergence Rates and Practical Acceleration Strategies. *Conf. on Uncertainty in Artificial Intelligence (UAI)*, 2017. (Acceptance Rate: 30.9%)
- C9 W. B. Haskell, R. Jain, and H. Sharma. A Dynamical Systems Framework for Stochastic Iterative Optimization. *Proc. of the IEEE Control and Decision Conf. (CDC)*, 2016.
- C8 Y. Quan, W. B. Haskell, and M. Tambe. Robust Strategy against Unknown Risk-averse Adversaries in Security Games. *International Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, 2015. (Acceptance Rate: 27%)
- C7 M. Brown, W. B. Haskell, M. Tambe. Robust patrol generation for fishery protection. *Conf. on Decision and Game Theory for Security (GameSec)*, 2014.
- C6 W. B. Haskell, D. Kar, F. Fang, M. Tambe, S. Cheung, and E. Denicola. Robust protection of fisheries with COMPASS. *Innovative Applications of Artificial Intelligence (IAAI)*, 2014.
- C5 W. B. Haskell, R. Jain, and D. Kalathil. Empirical Value Iteration for Approximate Dynamic Programming. *American Control Conf. (ACC)*, 2014.
- C4 Y. Quan, W. B. Haskell, A. Jiang, and M. Tambe. Online Planning for Optimal Protector Strategies in Resource Conservation Games. *International Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, 2014. (Acceptance Rate: 12%)
- C3 J. Kwak, P. Varakantham, W. B. Haskell, D. Kar, and M. Tambe. Building THINC: User Incentivization and Meeting Rescheduling for Energy Savings. *International Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, 2014. (Acceptance Rate: 12%)
- C2 W. B. Haskell and R. Jain. Dominance-constrained Markov decision processes. *Proc. of the IEEE Control and Decision Conf. (CDC)*, 2012.
- C1 A. Sadovsky, H. Swenson, W. B. Haskell, and J. Rakas. Optimal time advance in terminal area arrivals: Throughput vs. fuel savings. *Digital Avionics Systems Conference (DASC)*, 2011.

BOOK CHAPTERS

- B1 W. B. Haskell and F. Ordonez. Mixed-integer optimization methods for solving Stackelberg security games. *Improving Homeland Security Decisions*. Cambridge University Press, 2017.

FUNDED RESEARCH

- F9 National University of Singapore, "Randomized algorithms for large-scale constrained optimization", 2018 - 2021, S\$100,000. (Principal Investigator)
- F8 National University of Singapore, "Practical considerations for large-scale competitive decision making", 2017 - 2020, S\$464,350. (Principal Investigator)
- F7 Singapore Ministry of Education, "Practicable robust Markov decision processes", 2016 - 2018, S\$325,288. (Principal Investigator)
- F6 Agency for Science, Technology and Research, "ABCD: Analyzing Big Corrupted Data", 2016 - 2018, S\$211,995. (Principal Investigator)
- F5 Singapore Ministry of Education, "Practical algorithms for large-scale sequential optimization", 2016 - 2019, S\$574,680. (Principal Investigator)
- F4 Singapore Ministry of Education, "Risk-aware learning and optimization", 2016 - 2019, S\$154,000. (Principal Investigator)
- F3 Temasek Defence Systems Institute, "Dynamic security games and learning", 2015 - 2017, S\$45,600. (Principal Investigator)
- F2 Singapore Ministry of Education, "Resilient supply chains in interconnected infrastructure networks", 2015 - 2018, S\$170,000. (Principal Investigator)

F1 Singapore Ministry of Education, "Theory and methods for risk-aware sequential decision making", 2014 - 2017, S\$179,999. (Principal Investigator)

CONFERENCE PRESENTATIONS

- New function fitting methods in approximate dynamic programming. International Conference on Innovative Research in Science, Technology and Management (ICIRSTM), Singapore, September 2018.
- Preference Elicitation and Robust Optimization with Multi-Attribute Quasi-Concave Choice Functions. International Symposium on Mathematical Programming (ISMP), Bordeaux, July 2018.
- Empirical dynamic programming and randomized function fitting. INFORMS International, Taipei, June 2018.
- A Random Monotone Operator Framework for Strongly Convex Stochastic Optimization. IEEE Conference on Decision and Control (CDC), Melbourne, December 2017.
- Inexact iteration of averaged operators for non-strongly convex stochastic optimization. Allerton Conference on Communication, Control, and Computing, Monticello, October 2017.
- Sequential smoothing framework for convex-concave saddle point problems with application to large-scale constrained optimization. Allerton Conference on Communication, Control, and Computing, Monticello, October 2017.
- Simulation-based methods for robust Markov decision processes. International Conference on Continuous Optimization (ICCOPT), Tokyo, August 2016.
- Two methods for risk-aware sequential decision-making. International Conference on Stochastic Programming (ICSP), Buzios, June 2016.
- Learning with stochastic dominance. International Symposium on Mathematical Programming (ISMP), Pittsburgh, July 2015.
- Empirical dynamic programming - optimization and equilibrium computation. SoCal NEGT Symposium, Los Angeles, November 2013.
- Ambiguity in risk preferences in optimization and control. INFORMS Annual Meeting, Minneapolis, October 2013.

SELECTED INVITED TALKS

- Perspectives on risk-aware dynamic programming. The Ohio State University, ECE Department, July 2018.
- Markov chain methods for analyzing algorithms. Georgia Institute of Technology, ISyE Department, September 2017.
- Randomized algorithms for constrained convex optimization. Georgia Institute of Technology, ISyE Department, November 2016.
- Risk-aware online optimization. Singapore Management University, IS Department, April 2016.
- New convergence analysis for approximate dynamic programming. University of Southern California, CS Department, May 2015.
- Risk-aware Markov decision processes. Nanyang Technological University, CS Department, September 2014.
- Risk management in sequential decision making. National University of Singapore, ISE Department, April 2014.
- Stochastic dominance for dynamic risk management. University of Southern California, EE Department, April 2013.

POSTDOCTORAL RESEARCH FELLOWS

- Fu Sheng, 2018 - present (Ministry of Education Tier II)
- Antonios Varvitsiotis, 2018 - present (NUS Young Investigator Award)
- Xu Jianyu, 2017 - present (Ministry of Education Tier I)
- Pham Viet Hai, 2017 - present (NUS Young Investigator Award)
- Wei Bo, 2017 - present (Agency for Science, Technology and Research)
- Jukka Isohatala, 2017 - present (Ministry of Education Tier II)
- He Zhou, 2017 - 2018 (Ministry of Education Tier II)
- Chen Zhi, 2017 - 2018 (Ministry of Education Tier II)
- Yu Pengqian, 2017 - 2018 (Ministry of Education Tier II)
- Le Thi Khan Hien, 2016 - 2018 (Agency for Science, Technology and Research)
- Yu Guodong, 2015 - 2017 (Ministry of Education Tier I)

DOCTORAL STUDENTS

- Zhang Xun, 2017 - present (Co-supervisor w/ Ye Zhisheng)
- Zhao Sixiang, 2015 - present (Co-supervisor w/ Michele Cardin)
- Huang Wenjie, 2014 - present (Main supervisor)
- Yang Zhiyue, 2014 - 2017 (Co-supervisor w/ Tan Chin Hon)

MASTERS STUDENTS

- Zhao Renbo, 2016 - 2018 (Co-supervisor w/ Vincent Tan)
- Sun Menghua, 2015 - 2017 (Co-supervisor w/ Adam Ng)
- Pierre-Yves Queau, 2015 - 2017 (Co-supervisor w/ Ng Szu Hui)

TEACHING

- ISEM 6001 - graduate mathematical programming
Spring 2015 (5/5), Spring 2016 (4.4/5), Spring 2017 (4.5/5), Spring 2018 (4.8/5) National University of Singapore
- ISEM 2100 - undergraduate stochastic processes
Spring 2016 (4.1/5), Spring 2017 (4.2/5), Spring 2018 (4.1/5) National University of Singapore
- ISE 330 - undergraduate linear programming
Spring 2013 (4.5/5) University of Southern California
- ISE 331 - undergraduate stochastic processes
Spring 2012 (4.3/5) University of Southern California
- ISE 520 - graduate nonlinear programming
Fall 2011 (4.8/5), Fall 2012 (4.6/5) University of Southern California
- ISE 536 - graduate linear programming
Fall 2011 (4.8/5), Spring 2012 (4.8/5), Fall 2012 (4.9/5), Spring 2013 (4.7/5) University of Southern California

PROFESSIONAL SERVICE

- Reviewer for: IEEE Transactions on Automatic Control; SIAM Journal on Optimization; Mathematics of Operations Research; Operations Research; Probability in the Engineering and Informational Sciences; and Mathematical Programming
- Associate Editor for Journal of Management Science and Engineering (2018 - present)
- Senior Editor for Production and Operations Management (2018 - present)

REFERENCES

- Maged Dessouky
University of Southern California
Daniel J. Epstein Department of Industrial and Systems Engineering
3715 McClintock Avenue, GER 240
Los Angeles, CA 90089-0193
(1) 213-740-4893
maged@usc.edu
- Rahul Jain
University of Southern California
Ming Hsieh Department of Electrical Engineering
3740 McClintock Avenue, EEB 100
Los Angeles, CA 90089-2560
(1) 213-821-2351
rahul.jain@usc.edu
- J. George Shanthikumar
Purdue University
Krannert School of Management
100 S. Grant Street
West Lafayette, IN 47907-2076
(1) 765-494-9700
jshanthi@purdue.edu
- Z. Max Shen
University of California Berkeley
Department of Industrial Engineering and Operations Research
4141 Etcheverry Hall
Berkeley, CA 94720-1777
(1) 510-642-5484
shen@ieor.berkeley.edu
- Milind Tambe
University of Southern California
Department of Computer Science
3737 Watt Way, Powell Hall of Engineering 410
Los Angeles, CA 90089-0781
(1) 213-740-6447
tambe@usc.edu