SANTIAGO R. BALSEIRO

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Graduate School of Business
Columbia University
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RESEARCH INTERESTS

Pricing & Revenue Management, Digital Markets, Online Advertising, Stochastic Modeling, Dynamic Games, Mechanism Design, Approximation Algorithms, Data-driven Optimization

EDUCATION

2008 - 2013 **Columbia University**, New York, NY

Ph.D. in **Decision, Risk, and Operations**, Graduate School of Business
Advisors: Prof. Omar Besbes and Prof. Gabriel Y. Weintraub
Dissertation: "Competition and Yield Optimization in Ad Exchanges"

2001 - 2007 **Universidad de Buenos Aires**, Argentina

Bachelor and Master degrees in **Industrial Engineering**

ACADEMIC APPOINTMENTS

Columbia University, Graduate School of Business, New York, NY
Decision, Risk, and Operations Division

07/2022 - Present	Associate Professor (with tenure)
07/2020 - 06/2022	Daniel W. Stanton Associate Professor of Business
01/2019 - 06/2020	Associate Professor
07/2017 - 12/2018	Assistant Professor

Duke University, Fuqua School of Business, Durham, NC
Decision Sciences Area

07/2013 - 06/2017	Assistant Professor

JOURNAL PAPERS

1. "Contextual Standard Auctions with Budgets: Revenue Equivalence and Efficiency Guarantees," with C. Kroer and R. Kumar. **Management Science** (forthcoming).
   - Michael H. Rothkopf Junior Researcher Paper Prize, Finalist, 2022 (Entrant: R. Kumar).
2. "Survey of Dynamic Resource Constrained Reward Collection Problems: Unified Model and Analysis," with O. Besbes and D. Pizarro. **Operations Research** (forthcoming).

3. "Incentive-Compatible Assortment Optimization for Sponsored Products," with A. Desir. **Management Science** (forthcoming).
4. "Contextual Bandits with Cross-Learning," with N. Golrezaei, M. Mahdian, V. Mirrokni, J. Schneider. **Mathematics of Operations Research** (forthcoming).
5. "Mechanism Design under Approximate Incentive Compatibility," with O. Besbes and F. Castro. **Operations Research** (forthcoming).
6. "Dynamic Double Auctions: Towards First Best,", with V. Mirrokni, R. Paes Leme and S. Zuo. **Operations Research**, July–August 2022.
7. "The Best of Many Worlds: Dual Mirror Descent for Online Allocation Problems," with H. Lu and V. Mirrokni. **Operations Research**, January–February 2023.
   - Revenue Management and Pricing Section Prize, 2023.
   - Michael H. Rothkopf Junior Researcher Paper Prize, 2022 (Entrant: H. Lu).
8. "On the Futility of Dynamics in Robust Mechanism Design,", with A. Kim and D. Russo. **Operations Research**, November–December 2021.
9. "Budget Management Strategies in Repeated Auctions,", with A. Kim, M. Mahdian, and V. Mirrokni. **Operations Research**, May–June 2021.
10. "Dynamic Pricing of Relocating Resources in Large Networks," with D.B. Brown and C. Chen. **Management Science**, July 2021.
    - Revenue Management and Pricing Section Student Paper Prize, 2019 (Entrant: C. Chen).
11. "Online Display Advertising Markets: A Literature Review and Future Directions," with H. Choi, C.F. Mela, and A. Lery. **Information Systems Research**, June 2020.
12. "Multi-stage Intermediation in Online Advertising," with O. Candogan and H. Gurkan. **Manufacturing & Service Operations Management**, May–June 2021.
13. "Dynamic Mechanism Design with Budget Constrained Buyers under Limited Commitment," with O. Besbes and G. Weintraub. **Operations Research**, May–June 2019.
14. "Multi-Agent Mechanism Design without Money," with H. Gurkan and P. Sun. **Operations Research**, September–October 2019.
15. "Learning in Repeated Auctions with Budgets: Regret Minimization and Equilibrium," with Y. Gur. **Management Science**, September 2019.
    - Junior Faculty Interest Group Best Paper Award, Honorable Mention, 2018.
16. "Approximations to Stochastic Dynamic Programs via Information Relaxation Duality," with D.B. Brown. **Operations Research**, March–April 2019.
17. "Static Routing in Stochastic Scheduling: Performance Guarantees and Asymptotic Optimality," with D.B. Brown and C. Chen. **Operations Research**, November–December 2018.
18. "Dynamic Mechanisms with Martingale Utilities," with V. Mirrokni and R. Paes Leme. **Management Science**, November 2018.

19. "Optimal Contracts for Intermediaries in Online Advertising," with O. Candogan. **Operations Research**, July–August 2017.

20. "Bounds on the Welfare Loss of Moral Hazard with Limited Liability,", with F. Balmaceda, J.R. Correa, and N.E. Stier-Moses. **Games & Economic Behavior**, January 2016.

21. "Repeated Auctions with Budgets in Ad Exchanges: Approximations and Design," with O. Besbes and G. Weintraub. **Management Science**, January 2015.
    - Part of thesis that was awarded the 2014 George B. Dantzig Dissertation Award.
    - George Nicholson Student Paper Competition, Honorable Mention, 2014.

22. "Yield Optimization of Display Advertising with Ad Exchange," with J. Feldman, V. Mirrokni, and S. Muthukrishnan. **Management Science**, December 2014.
    - Part of thesis that was awarded the 2014 George B. Dantzig Dissertation Award.

23. "An Ant Colony Algorithm hybridized with insertion heuristics for the Time Dependent Vehicle Routing Problem with Time Windows," with I. Loiseau and J. Ramonet. **Computers & Operations Research**, 2011.

REFEREED CONFERENCE PROCEEDINGS

24. "Single-Leg Revenue Management with Advice," with C. Kroer and R. Kumar. **24rd ACM Conference on Economics and Computation (EC)**, 2023.

25. "Robust Auction Design with Support Information," with J. Anunrojwong and O. Besbes. **24rd ACM Conference on Economics and Computation (EC)**, 2023.

26. "Robust Budget Pacing with a Single Sample," with R. Kumar, V. Mirrokni,B. Sivan, and D. Wang. **Forty International Conference on Machine Learning (ICML)**, 2023.

27. "Online Resource Allocation under Horizon Uncertainty," with C. Kroer and R. Kumar. **ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)**, 2023.

28. "On the Robustness of Second-Price Auctions in Prior-Independent Mechanism Design," with J. Anunrojwong and O. Besbes. **23rd ACM Conference on Economics and Computation (EC)**, 2022.

29. "Contextual Standard Auctions with Budgets: Revenue Equivalence and Efficiency Guarantees," with C. Kroer and R. Kumar. **23rd ACM Conference on Economics and Computation (EC)**, 2022.

30. "Optimal Mechanisms for Value Maximizers with Budget Constraints via Target Clipping," with Y. Deng, J. Mao, V. Mirrokni, and S. Zuo. **23rd ACM Conference on Economics and Computation (EC)**, 2022.

31. "Robust Auction Design in the Auto-bidding World," with Y. Deng, J. Mao, V. Mirrokni, and S. Zuo. **35st Annual Conference on Neural Information Processing Systems (NeurIPS)**, 2021.

32. "The Landscape of Auto-Bidding Auctions: Value Versus Utility Maximization," with Y. Deng, J. Mao, V. Mirrokni, and S. Zuo. **22th ACM Conference on Economics and Computation (EC)**, 2021.

33. "Regularized Online Allocation Problems: Fairness and Beyond," with H. Lu and V. Mirrokni. **Thirty-eigth International Conference on Machine Learning (ICML)**, 2021.

34. "Non-excludable Dynamic Mechanism Design," with V. Mirrokni, R. Paes Leme and S. Zuo. **ACM-SIAM Symposium on Discrete Algorithms (SODA)**, 2021.

35. "Dual Mirror Descent for Online Allocation Problems," with H. Lu and V. Mirrokni. **Thirty-seventh International Conference on Machine Learning (ICML)**, 2020.

36. "Budget-Constrained Incentive Compatibility for Stationary Mechanisms," with A. Kim, M. Mahdian, and V. Mirrokni. **21th ACM Conference on Economics and Computation (EC)**, 2020.

37. "Contextual Bandits with Cross-Learning," with N. Golrezaei, M. Mahdian, V. Mirrokni, J. Schneider. **33st Annual Conference on Neural Information Processing Systems (NeurIPS)**, 2019.

38. "Dynamic Pricing of Relocating Resources in Large Networks," with D.B. Brown and C. Chen. **ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)**, 2019.

39. "Dynamic Double Auctions: Towards First Best," with V. Mirrokni, R. Paes Leme and S. Zuo. **ACM-SIAM Symposium on Discrete Algorithms (SODA)**, 2019.

40. "Dynamic Revenue Sharing," with M. Lin, V. Mirrokni, R. Paes Leme and S. Zuo. **31st Annual Conference on Neural Information Processing Systems (NIPS)**, 2017.

41. "Learning in Repeated Auctions with Budgets: Regret Minimization and Equilibrium," with Y. Gur. **18th ACM Conference on Economics and Computation (EC)**, 2017.

42. "Budget Management Strategies in Repeated Auctions," with A. Kim, M. Mahdian, and V. Mirrokni. **26th International World Wide Web Conference (WWW)**, 2017.

43. "Dynamic Mechanisms with Martingale Utilities," with V. Mirrokni and R. Paes Leme. **18th ACM Conference on Economics and Computation (EC)**, 2017.

44. "Dynamic Mechanism Design with Budget Constrained Buyers under Limited Commitment," with O. Besbes and G. Weintraub. **17th ACM Conference on Economics and Computation (EC)**, 2016.

45. "Repeated Auctions with Budgets in Ad Exchanges: Approximations and Design," with O. Besbes and G. Weintraub. **14th ACM Conference on Economics and Computation (EC)**, 2013.

46. "Yield Optimization of Display Advertising with Ad Exchange," with J. Feldman, V. Mirrokni, and S. Muthukrishnan. **12th ACM Conference on Economics and Computation (EC)**, 2011.
47. "Bounds on the Welfare Loss of Moral Hazard with Limited Liability," with F. Balmaceda, J.R. Correa, and N.E. Stier-Moses. **6th International Workshop on Internet & Network Economics (WINE)**, 2010.

WORKING PAPERS AND ONGOING WORK

- "Joint Feedback Loop for Spend and Return-On-Spend Constraints," with K. Bhawalkar, Z. Feng, H. Lu, V. Mirrokni, B. Sivan, and D. Wang. Working paper.
- "Optimal Mechanisms for a Value Maximizer: The Futility of Screening Targets," with Y. Deng, V. Mirrokni, J. Mao, and S. Zuo. Working paper.
- "Regularized Online Allocation Problems: Fairness and Beyond," with H. Lu and V. Mirrokni. Working paper.
- "From Online Optimization to PID Controllers: Mirror Descent with Momentum," with H. Lu, V. Mirrokni, and B. Sivan. Working paper.
- "Uniformly Bounded Regret in Dynamic Fair Allocation," with S. Xia. Working paper.

GRANTS AND AWARDS

- Donald P. Gaver, Jr. Early Career Award for Excellence in Operations Research, 2023.
- Revenue Management and Pricing Section Prize, 2023.
- Michael H. Rothkopf Junior Researcher Paper Prize, Finalist, 2023 (Entrant: R. Kumar).
- George Nicholson Student Paper Competition, Finalist, 2022 (Entrant: J. Anunrojwong).
- Michael H. Rothkopf Junior Researcher Paper Prize, 2022 (Entrant: H. Lu).
- Revenue Management and Pricing Section Student Paper Prize, 2019 (Entrant: C. Chen).
- Junior Faculty Interest Group Best Paper Award, Honorable Mention, 2018.
- Google Faculty Research Award, Summer 2015. Amount: $64,000.
- George B. Dantzig Dissertation Award, First Place, 2014.
- George Nicholson Student Paper Competition, Honorable Mention, 2014.
- Networks, Electronic Commerce, and Telecommunications (NET) Institute Summer Grant, 2012. Amount: $7500.
- Deming Doctoral Fellowship, Columbia University, 2011. Amount: $10,000.
- Google Engineering Intern Scholarship, 2010. Amount: $10,000.
- Full Tuition and Fellowship, Graduate School of Business, Columbia University, 2008-2013.

SERVICE

- Associate Editor, Revenue Management and Market Analytics Department, Management Science (2020-present).
- Associate Editor, Revenue Management and Market Analytics Department, Operations Research (2021-present).
- Associate Editor, Services, Platforms and Revenue Management Department, Manufacturing & Service Operations Management (2021-present).
- *Committees:* senior program committee member for the Economics, Monetization, and Online Markets track of TheWebConf 2022, 2020 Revenue Management and Pricing Student Prize committee, program committee of the 2019 and 2022 Revenue Management and Pricing Conference, the program committee of the 2019, 2020, and 2022 ACM Conference on Economics, senior program committee of the 2022 Conference on Web and Internet Economics, program committee of the 2019 Conference on Web and Internet Economics, 2022 Nicholson Student Paper Competition committee.
- *Conference organization:* co-chair for the Economics, Monetization, and Online Markets track of TheWebConf 2020 (formerly known as WWW), co-chair for the Revenue Management and Pricing cluster at the 2020 INFORMS Annual Meeting, co-chair for the 11th Ad Auctions Workshop in 2015.

INVITED TALKS AND CONFERENCE PRESENTATIONS

- *Optimal Mechanisms for Value Maximizers with Budget Constraints via Target Clipping*
  - 23th ACM Conference on Economics and Computation (EC), 2022
- *The Landscape of Auto-Bidding Auctions: Value Versus Utility Maximization*
  - 22th ACM Conference on Economics and Computation (EC), 2021
  - AdKDD 2022, Keynote Speaker
- *Regularized Online Allocation Problems: Fairness and Beyond*
  - INFORMS Annual Meeting, October 2021
- *Dual Mirror Descent for Online Allocation Problems*
  - Google Research Seminar, June 2021
  - Thirty-seventh International Conference on Machine Learning (ICML), July 2020
  - University of Illinois Urbana-Champaign, Department of Industrial and Systems Engineering, September 2022; Peking University, EconCS Group, November 2022; Baruch College, Zicklin School of Business, March 2023
  - 6th Workshop in Operations, Networks & Data Analytics, Universidad Torcuato Di Tella, Buenos Aires, Argentina, December 2022
- *Incentive Compatible Assortment Optimization*
  - INFORMS Annual Meeting, November 2020

  - Sixth Workshop on Marketplace Innovation, June 2021

- *Dynamic Double Auctions: Towards First Best*
  - INFORMS 19th Annual Revenue Management & Pricing Section Conference, Stanford, CA, June, 2019
  - INFORMS Annual Meeting, Seattle, WA, October 2019

- *Dynamic Pricing of Relocating Resources in Large Networks*
  - Johnson School of Business, Cornell Tech, New York, NY, November 2019; Operations Management Seminar Series, MIT Sloan of Management, September 2020; AGCO (Algorithms, Games, Combinatorics, and Optimization) Seminar, University of Chile, October 2020; Department of Technology, Operations & Statistics, NYU Stern School of Business, November 2020; Stanford Graduate School of Business, February 2021
  - 5th Workshop in Operations, Networks & Data Analytics, Universidad Torcuato Di Tella, Buenos Aires, Argentina, December 2019

- *Approximations to Stochastic Dynamic Programs via Information Relaxation Duality*
  - 4th Workshop in Operations, Networks & Data Analytics, Universidad Torcuato Di Tella, Buenos Aires, Argentina, December 2018

- *Budget Management Strategies in Repeated Auctions*
  - INFORMS Annual Meeting, Houston, TX, October 2017
  - 12th Workshop on the Economics of Advertising and Marketing, Columbia University, New York, NY, July 2018
  - Google Research Summit, Mountain View, CA, September 2019

- *Learning in Repeated Auctions with Budgets: Regret Minimization and Equilibrium*
  - 18th ACM Conference on Economics and Computation, Cambridge, MA, June 2017
  - 3rd Workshop in Operations, Networks & Data Analytics, Universidad Torcuato Di Tella, Buenos Aires, Argentina, December 2017
  - Columbia Business School, May 2018; Google NYC Research Seminar, June 2018; The University of Chicago Booth School of Business, Chicago, IL, May 2019
  - 18th Annual Revenue Management & Pricing Section Conference, Toronto, Canada, June 2018

- *Multi-agent Mechanism Design without Money*
  - Colorado State University, Department of Agricultural and Resource Economics, Fort Collins, CO, September 2018

- *Dynamic Mechanisms with Martingale Utilities (formerly titled "Bundling Over Time and Martingale Auctions")*

- Google's Market Algorithms Workshop, New York, NY, January 2016
- 11th Utah Winter Operations Conference, Snowbird, UT, February 2016
- Marketplace Innovation Workshop, New York, NY, June 2016
- INFORMS Annual Meeting, Nashville, TN, November 2016
- 18th ACM Conference on Economics and Computation, Cambridge, MA, June 2017
- University of North Carolina at Chapel Hill (2017), Columbia Business School (2017)
- Mostly OM, International Workshop on Advanced Topics in Operations Management, Beijing, China, June 2018

◦ *Multi-stage Intermediation in Display Advertising*

- 15th Annual Revenue Management & Pricing Section Conference, New York, NY, June 2015
- INFORMS Annual Meeting, Philadelphia, PA, November 2015

◦ *Dynamic Mechanism Design with Budget Constrained Buyers under Limited Commitment*

- INFORMS Manufacturing & Service Operations Management Conference, Seattle, WA, June 2014
- INFORMS Annual Meeting, San Francisco, CA, November 2014
- INFORMS Applied Probability Society, Istanbul, Turkey, July 2015
- INFORMS Annual Meeting, Philadelphia, PA, November 2015
- Columbia Business School (2015), Google Research Seminar Series (2015)
- 1st Workshop in Operations, Networks & Data Analytics, Universidad Torcuato Di Tella, Buenos Aires, Argentina, December 2015
- 11th Utah Winter Operations Conference, Snowbird, UT, February 2016

◦ *Bidding under Budget Constraints in Online Advertising: Shading versus Throttling*

- INFORMS Annual Meeting, Minneapolis, MN, October 2013

◦ *Repeated Auctions with Budgets in Ad Exchanges: Approximations and Design (formerly titled "Auctions for Online Display Advertising Exchanges: Approximations and Design")*

- INFORMS Annual Meeting, Phoenix, AZ, 2012
- INFORMS Manufacturing & Service Operations Management Conference, New York, NY, 2012
- 21st International Symposium on Mathematical Programming, Berlin, Germany, 2012
- Tuck School of Business (2012), Kellogg School of Management (2012), Singapore Management University (2012), SUTD (2012), The Wharton School (2013), NYU Stern (2013), Fuqua School of Business (2013), Yale School of Management (2013), INSEAD

(2013), Universitat Pompeu Fabra (2013), IESE (2013), UC Irvine (2013), Stanford Graduate School of Business (2013), UT Austin (2013), University of Rochester (2013), UT Dallas (2013), Cornell ORIE (2013), USC Marshall School of Business (2013), Duke CS-ECON Seminar Series (2013)

  - Microsoft Research (November 2012); Mercado Libre, Buenos Aires, Argentina (December 2012); Google Research (March 2013); Despegar.com, Buenos Aires, Argentina (December 2013)
  - 45th ACM Symposium on the Theory of Computing (STOC), Stanford University, June 2013
  - INFORMS Annual Meeting, San Francisco, CA, November 2014 (Nicholson and Dantzig Awards)

- *Yield Optimization of Display Advertising with Ad Exchange*
  - 12th ACM Conference on Electronic Commerce, San Jose, CA, 2011
  - 11th Annual Revenue Management & Pricing Section Conference, New York, NY, 2011
  - INFORMS Annual Meeting, Charlotte, NC, 2011
  - Mercado Libre, Buenos Aires, Argentina 2012
  - INFORMS Annual Meeting, San Francisco, CA, November 2014 (Dantzig award)
- *Bounds on the Welfare Loss of Moral Hazard with Limited Liability (formerly titled "The Cost of Moral hazard and Limited Liability in the Principal-Agent Problem")*
  - 6th Workshop on Internet & Network Economics, Stanford University, 2010
  - INFORMS Annual Meeting, Austin, TX, 2010
- *Revenue Management of Consumer Options for Sporting Events*
  - Google Seminar Series, New York, NY, 2011
  - ALIO-INFORMS Joint International Meeting, Buenos Aires, Argentina, June 2010
- *Integrated Planning Models for Capacity Planning and Call Routing in Call Center Networks with General SLAs*
  - INFORMS Annual Meeting, Austin, TX, 2010
- *An Ant Colony Algorithm hybridized with insertion heuristics for the Time Dependent Vehicle Routing Problem with Time Windows*
  - LVII Annual Meeting of the Argentine Mathematical Union, Cordoba, Argentina, 2007

OUTSIDE ACTIVITIES

Columbia Business School requires faculty members to disclose any activities that might present a real or apparent conflict of interest. The list below complies with this requirement.

Google Research, New York, NY

02/2019 - Present	Research Scientist
07/2016 - 07/2018	Research Advisor