

Ping Cao

Professor, School of Management, University of Science and Technology of China

Contact Information

- Office: Room 707A, Management Teaching & Research Building, East District, University of Science and Technology of China (USTC)
- Address: No. 96, Jinzhai Road, Baohe District, Hefei, Anhui, China, 230026
- Email: pcao@ustc.edu.cn
- Office Number: +86 551-63606511
- ORCID: <https://orcid.org/0000-0001-7801-9754>

Academic Appointment

- 2022.08–present Ph.D. supervisor, USTC, Hefei, China
- 2022.01–present Professor (special appointed), School of Management, USTC, Hefei, China
- 2020.06–2021.12 Associate Professor with tenure, School of Management, USTC, Hefei, China
- 2013.07–2020.05 Associate Professor (tenure-track, special appointed), School of Management, USTC, Hefei, China

Education

- Ph.D. in Operational Research, Academy of Mathematics and Systems Science (AMSS), Chinese Academy of Science (CAS), Beijing, 2011
 - Dissertation: *Software Reliability Testing: Modeling and Optimization* (in Chinese).
 - Advisor: Prof. Ke Liu.
- B.S. in Mathematics and Applied Mathematics, Department of Mathematics, USTC, Hefei, 2006

Visiting and Working Experience

- 2019.08–2020.04 Research Fellow, National University of Singapore, Singapore
- 2018.03–2019.03 Visiting Scholar, North Carolina State University, Raleigh, the United States
- 2017.12–2018.01 Research Fellow, City University of Hong Kong, Hong Kong
- 2017.01–2017.03 Research Associate, The Chinese University of Hong Kong (CUHK), Hong Kong
- 2016.06–2016.07 Research Associate, CUHK, Hong Kong
- 2015.07–2015.10 Research Associate, CUHK, Hong Kong
- 2011.07–2013.07 Post-doctor, AMSS, CAS, Beijing, China
- 2010.09–2011.01 Research Intern, MSCI Inc., Beijing, China

Research Interests

- *Stochastic Optimal Control*
- *Queueing Model*

- Fluid and Diffusion Approximation
- Dynamic Scheduling and Routing
- *Dynamic Contract Design*
- *Queueing Games*
- *Dynamic Pricing and Revenue Management*
- *Markov Decision Process*

Book

- K. Liu, P. Cao. *Markov Decision Processes: Theory and Applications* (in Chinese), Science Press, 2015.

Refereed Journal Papers

1. P. Cao, Z. Zhong. Asymptotically Optimal Routing of a Many-Server Parallel Queueing System With Long-Run Average Criterion. *European Journal of Operational Research*, accepted.
2. H. Liu, P. Cao, Y. Wang. Omnichannel Services in the Presence of Customers' Valuation Uncertainty, *Naval Research Logistics*, accepted.
3. P. Cao, D. Wang, D. Yao. Optimal Drift Rate Control and Two-Sided Impulse Control for a Brownian System with the Long-Run Average Criterion. *Advances in Applied Probability*, accepted.
4. W. Zhou, H. Liu, P. Cao, Y. Wang. Optimal Pricing for On-Demand Service Platforms with Heterogeneous Customer Demand Frequencies. *Transportation Research Part E: Logistics and Transportation Review*, 189, 2024, 103676.
5. Z. Zhong, P. Cao, J. Huang, S.X. Zhou. Capacity Allocation and Scheduling in Two-Stage Service Systems with Multi-Class Customers. *Manufacturing & Service Operations Management*, 26(5), 2024, 1842–1859.
 - Third place in the best paper competition at the CSAMSE Conference, Xiamen, 2024.
6. H. Liu, P. Cao, L.H. Lee, E.P. Chew. Similarity-based Sampling for Simulation with Stochastic Binary Outcomes. *IIE Transactions*, 56(11), 2024, 1176–1188.
7. W. Zhou, S. Zhu, P. Cao, J. Wu. Analysis of an On-Demand Food Delivery Platform: Participatory Equilibrium and Two-Sided Pricing Strategy. *Journal of the Operational Research Society*, 75(6), 2024, 1193–1204.
8. P. Cao, P. Sun, F. Tian. Punish Underperformance with Suspension: Optimal Dynamic Contracts in the Presence of Switching Cost. *Management Science*, 70(5), 2024, 3020–3037.
9. P. Cao, J. Huang, J. Xie. Asymptotic Optimal Scheduling of V -Systems with Deadlines and Customer Abandonment. *Queueing Models and Service Management*, 6(2), 2023, 29–58.
10. W. Xu, P. Cao. Application of Markov Decision Process in the Treatment of Rheumatoid Arthritis (in Chinese), *Operations Research and Management Science* (in Chinese), 32(9), 2023, 150–156.
11. Z. Zhong, P. Cao. Balanced Routing with Partial Information in a Distributed Parallel Many-Server Queueing System. *European Journal of Operational Research*, 304(2), 2023, 618–633.
12. P. Cao, D. Yao. Optimal Pricing and Inventory Control Strategies for a Continuous-Review System with Product Return. *Operations Research Letters*, 50(3), 2022, 295–302.
13. P. Cao, W. Zhou, J. Wu. Optimal Pricing Strategy for a Service Provider in the Presence of Repetitive Usage. *International Transactions in Operational Research*, 29(4), 2022, 2586–2612.

14. **P. Cao**, F. Tian, P. Sun. Comment on “Optimal Contract to Induce Continued Effort”. *Management Science*, 68(1), 2022, 796–808.
15. **P. Cao**, Z. Zhong, J. Huang. Dynamic Routing in a Distributed Parallel Many-Server Service System: The Effect of ξ -Choice. *European Journal of Operational Research*, 294(1), 2021, 219–235.
16. **P. Cao**, S. He, J. Huang, Y. Liu. To Pool or Not to Pool: Queueing Design for Large-Scale Service Systems. *Operations Research*, 69(6), 2021, 1866–1885.
17. N. Zhao, Q. Wang, **P. Cao**, J. Wu. Pricing Decisions with Reference Price Effect and Risk Preference Customers. *International Transactions in Operational Research*, 28(4), 2021, 2081–2109.
18. X. Hou, Y. Guo, **P. Cao**. Commission Production Contracts with Revenue Sharing for a Capacitated Manufacturer and Multiple Retailers. *European Journal of Industrial Engineering*, 14(4), 2020, 517–543.
19. **P. Cao**, K. Yang, K. Liu. Optimal Selection and Release Problem in Software Testing Process: A Continuous Time Stochastic Control Approach. *European Journal of Operational Research*, 285(1), 2020, 211–222.
20. **P. Cao**, Y. Wang, J. Xie. Priority Service Pricing with Heterogeneous Customers: Impact of Delay Cost Distribution. *Production and Operations Management*, 28(11), 2019, 2854–2876.
 - Best paper award in the 9th International Workshop on Behavior Operations Management, Shenyang, 2017.
21. N. Zhao, Q. Wang, **P. Cao**, J. Wu. Dynamic Pricing with Reference Price Effect and Price-Matching Policy in the Presence of Strategic Consumers. *Journal of the Operational Research Society*, 70(12), 2019, 2069–2083.
22. Y. Wang, Y. Fan, T. Zhu, **P. Cao**, J. Xie. An Approximation Method for 2-Chain Flexible Queues with Preemptive Priority. *International Journal of Production Research*, 57(19), 2019, 5935–5950.
23. **P. Cao**, N. Zhao, J. Wu. Dynamic Pricing with Bayesian Demand Learning and Reference Price Effect. *European Journal of Operational Research*, 279(2), 2019, 540–556.
24. **P. Cao**, D. Yao. Dual Sourcing Policy for a Continuous-Review Stochastic Inventory System. *IEEE Transactions on Automatic Control*, 64(7), 2019, 2921–2928.
25. **P. Cao**, D. Yao. Optimal Drift Rate Control and Impulse Control for a Stochastic Inventory/Production System. *SIAM Journal on Control and Optimization*, 56(3), 2018, 1856–1883.
 - Outstanding paper youth award in the Operations Research Society of Beijing, Beijing, 2018.
26. **P. Cao**, J. Xie. Optimal Control of an Inventory System with Joint Production and Pricing Decisions. *IEEE Transactions on Automatic Control*, 61(12), 2016, 4235–4240.
27. **P. Cao**, J. Xie. Optimal Control of a Multiclass Queueing System When Customers Can Change Types. *Queueing Systems*, 82(3), 2016, 285–313.
28. J. Xie, **P. Cao**, B. Huang, M. Ong. Determining the Conditions for Reverse Triage in Emergency Medical Services Using Queueing Theory. *International Journal of Production Research*, 54(11), 2016, 3347–3364.
29. **P. Cao**, M. Fan, K. Liu. Optimal Dynamic Pricing Problem Considering Patient and Impatient Customers’ Purchasing Behavior. *International Journal of Production Research*, 53(22), 2015, 6719–6735.
30. **P. Cao**, Z. Dong, K. Liu, K.Y. Cai. Quantitative Effects of Software Testing on Reliability Improvement in the Presence of Imperfect Debugging. *Information Sciences*, 218(1), 2013, 119–132.

31. **P. Cao**, J. Li, H. Yan. Optimal Dynamic Pricing of Inventories with Stochastic Demand and Discounted Criterion. *European Journal of Operational Research*, 217(3), 2012, 580–588.
32. X. Yan, **P. Cao**, M. Zhang, K. Liu. The Optimal Production and Sales for a New Production with Negative Word-of-Mouth. *Journal of Industrial & Management Optimization*, 7(1), 2011, 117–138.
33. K. Y. Cai, **P. Cao**, Z. Dong, K. Liu. Mathematical Modeling of Software Reliability Testing with Imperfect Debugging. *Computers & Mathematics with Applications*, 59(10), 2010, 3245–3285.

Conference Papers

1. X. Li, **P. Cao**, F. Wu, L. Liu. Research on Information Centrality in Satellite Network. *International Conference on Electrical, Control and Automation Engineering*, 2013, 591–596.
2. X. Yan, **P. Cao**, M. Zhang, K. Liu. Impacts of Random Capacity and Fluctuating Environment on Inventory Systems. *Proceedings of the IEEE International Conference on Industrial Engineering and Engineering Management*, 2010, 1180–1183.
3. **P. Cao**, Z. Dong, K. Liu. An Optimal Release Policy for Software Testing Process. *Proceedings of the 29th Chinese Control Conference*, 2010, 6036–6041.

Working Papers

1. S. Zhu, X. Yang, W. Zhou, **P. Cao**. Dynamic Price Competition and Promotion Strategy for Differentiated Platforms with the Network Effect.
2. Y. Wang, **P. Cao**, J. Xie, D. Zhan. Advance Selling and Upgrading in Priority Queues. Major revision at *Manufacturing & Service Operations Management*.
3. **P. Cao**, M. Fan, K. Liu. Dynamic Pricing with Positive Network Externality.
4. K. Yang, **P. Cao**, S. Cai, K. Liu. Optimal Software Testing for Minimizing the Testing Times with Given Delivered Reliability.
5. **P. Cao**, Z. Dong, K. Liu, K. Y. Cai. Robust Dynamic Selection of Tested Modules in Software Testing Process for Maximizing Delivered Reliability.

Teaching Courses

- *Stochastic Process (A)*, co-instructor with Qunqiang Feng
 - 2022 Spring
- *Stochastic Process (B)*
 - 2020 Autumn, 2022 Spring, 2024 Spring
- *Stochastic System: Modelling and Simulation*
 - 2020–2024 Autumn
- *Operations Research (III)*, co-instructor with Lindong Liu and Xiaobei Shen
 - 2023–2024 Spring
- *Data, Model and Decision* (MBA core course)
 - 2017 Autumn, 2021–2024 Autumn
- *Introduction to Dynamic Analysis of Socio-Economical Systems*
 - 2014–2017 Spring

- *Management Statistics* (MBA core course)
 - 2013–2016 Autumn, 2015 Spring

Research Funds

- National Natural Science Foundation of China General Program, *Research of Optimization, Control and Contract Design for Large-scale Stochastic Service Systems*, CNY 420 000, 2025.01–2028.12, **PI** (principal investigator).
- National Natural Science Foundation of China for Excellent Young Scholars, *Optimal Control and Optimization of Stochastic Models*, CNY 2 000 000, 2022.01–2024.12, **PI**.
- University Startup Fund, *Pricing and Learning Strategy in Stochastic Service Systems*, CNY 300 000, 2020.09–2022.12, **PI**.
- National Natural Science Foundation of China General Program, *Research of Service Mechanism and Online Dynamic Pricing Policy for Service Firms*, CNY 490 000, 2018.01–2021.12, **PI**.
 - Ex post evaluation: extra excellent.
- National Natural Science Foundation of China Youth Program, *Study on Dynamic Pricing Strategy Considering Retailer's Investment Behavior*, CNY 210 000, 2015.01–2017.12, **PI**.
- Fundamental Research Funds for the Central Universities, *Study on Dynamic Pricing Strategy Under Risk Aversion in Revenue Management*, CNY 50 000, 2014.01–2015.12, **PI**.

Academic Service

- Associate editor for journals
 - *Journal of Systems Science and Complexity*
 - *Operations Research and Management Science* (in Chinese)
- Referee for journals:
 - *ACM Transactions on Internet Technology*
 - *Acta Mathematicae Applicatae Sinica* (English Series)
 - *Advances in Applied Probability, Journal of Applied Probability*
 - *Annals of Operations Research*
 - *Communications in Mathematics and Statistics*
 - *Computers & Industrial Engineering*
 - *Computers and Operations Research*
 - *European Journal of Operational Research*
 - *IEEE Transactions on Automatic Control*
 - *Information Sciences*
 - *International Journal of Production Research*
 - *Journal of Management Sciences in China* (in Chinese)
 - *Journal of the Operational Research Society*
 - *Journal of Systems Science and Complexity*

- *Management Science*
- *Naval Research Logistics*
- *Numerical Algebra, Control and Optimization*
- *OMEGA: The International Journal of Management Science*
- *Operations Research*
- *Quality Technology & Quantitative Management*
- *SIAM Journal on Control and Optimization*
- *Stochastics: An International Journal of Probability and Stochastic Processes*
- *Sustainable Cities and Society*
- Referee for research grant proposals:
 - National Natural Science Foundation of China (2018–2024)
 - Research Grants Council of Hong Kong (2019–2024)
- Mathematical Reviews (MRN: 138018)
- Session chair of
 - 2022 POMS International Conference in China, Xi’an
- Best student paper competition reviewer for
 - 2023 POMS International Conference in China, Hangzhou

School Service

- 2021.07–present Vice Director for the MBA Program, School of Management, USTC

Supervised Ph.D. Students

- Mei Huang (USTC)
- Xiaodao Wang (USTC, expected 2026)
- Huan Liu (USTC, expected 2025)
- Wenli Zhou (USTC, 2023), co-advised with Jie Wu.
 - Dissertation: *Research on Pricing Strategy of Service Platform under Sharing Economy*.
 - First job placement: post-doc at School of Management, USTC.
- Yaolei Wang (USTC, 2020), co-advised with Jingui Xie.
 - Dissertation: *Priority Service Pricing with Heterogeneous Customer Delay Costs* (Nominated for best doctoral thesis of USTC).
 - National scholarship for doctoral students 2019
 - First job placement: post-doc at School of Management, USTC.
- Zhiheng Zhong (CUHK, 2019), co-advised with Junfei Huang and Sean X. Zhou.
 - Dissertation: *Asymptotic Analysis of Queueing Theory with Healthcare Applications* (CUHK Young Scholars Thesis Award 2019).
 - First job placement: assistant professor at Business School, Hunan University.

- Nenggui Zhao (USTC, 2019), co-advised with Jie Wu.
 - Dissertation: *Dynamic Pricing with Reference Price Effect*.
 - First job placement: assistant professor at School of Management, Hefei University of Technology.

Awards

- 2020 Zhang Zhongzhi Youth Teacher Award, USTC
- 2015 Wang Kuancheng Yucai Award (second class prize), USTC
- 2011 Outstanding Winner of Bosera Scholarship, CAS
- 2010 Outstanding Student Scholarship of AMSS, CAS; Yong-An Futures Scholarship of CAS
- 2002–2006 Zhang Zhongzhi Scholarship, twice the Third-Class Outstanding Student Scholarship, the Third-Class New Student Scholarship, USTC
- 2000–2002 Twice the First-Class Prize of the National Senior High School Mathematical Contest

Invited Presentations

- 2024.10 INFORMS Annual Meeting, Seattle, *Optimal Dynamic Contracts for Teams*.
- 2024.10 City University of Hefei, Hefei, *Capacity Allocation and Scheduling in Two-Stage Service Systems with Multiclass Customers*.
- *Punish Underperformance with Suspension—Optimal Dynamic Contracts in the Presence of Switching Cost*.
 - 2023.11 Academy of Mathematics and Systems Science, Chinese Academy of Science, Beijing
 - 2023.02 Zero One Forum, Anhui Normal University, Wuhu
 - 2023.01 2023 POMS-HK Conference, The Hong Kong Polytechnic University, Hong Kong (online)
 - 2022.09 Beihang SEM Seminar, Beihang University, Beijing (online)
- 2022.06 2022 POMS International Conference in China, Xi'an (online):
 - *To Mine or Not to Mine? A Fluid Mean-Field Equilibrium of the Bitcoin Blockchain System*
 - *To Pool or Not to Pool: Queueing Design for Large-Scale Service Systems*.
- 2021.09 USTC Diner Workshop, Hefei, *Punish Underperformance with Resting—Optimal Dynamic Contracts in the Presence of Switching Cost*.
- 2021.08 Workshop on SLA Guarantees for Modern Communication Networks (Online), Huawei, *To Pool or Not to Pool: Queueing Design for Large-Scale Service Systems*.
- 2021.05 Hunan University, Changsha, *Optimal Dynamic Contract with “Good” Arrival*.
- 2020.11 Virtual 2020 INFORMS Annual Meeting, *Priority Queues with Upgrades*.
- *The Value of ξ -Choice: Dynamic Routing in a Many-Server Parallel Service System*
 - 2019.07 Beijing University of Posts and Telecommunications, Beijing
 - 2019.07 CSAMSE Conference, Chengdu
- *Priority Service Pricing with Heterogeneous Customers: Impact of Delay Cost Distribution*

- 2019.07 CSAMSE Conference, Chengdu
- 2019.06 EURO-K Conference, Dublin
- 2017.07 CASME Conference, Guangzhou, *Optimal Drift Rate Control and Impulse Control for a Stochastic Inventory/Production System.*
- 2016.12 Academy of Mathematics and Systems Science, Chinese Academy of Science, Beijing, *Online Priority Service Pricing with Heterogeneous Customers.*
- 2015.11 INFORMS Annual Meeting, Philadelphia, *Join the Shortest Queue with Many Servers.*

This curriculum vitae is current as of October 22, 2024.