Juan F. Fung

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Education

University of Illinois **Urbana-Champaign, IL**
PhD Economics, MS Statistics *August 2016*
- Dissertation: "Three Essays in Applied Market Design"

University of Missouri-St. Louis **St. Louis, MO**
MS Economics *May 2008*

New York University **New York, NY**
BA Economics *May 2003*

Employment

National Institute of Standards and Technology **Gaithersburg, MD**
Economist - Applied Economics Office *September 2016 - present*
- Lead interdisciplinary research teams across NIST, academia, and industry; develop comprehensive project plans with defined milestones, deliverables, and budgets; translate complex business and policy questions into data-driven research initiatives.
- Design and implement advanced analytical methodologies including econometric modeling with causal inference techniques, supervised and unsupervised machine learning algorithms, input-output analysis, and computational simulations to extract actionable insights from complex economic and disaster resilience datasets.
- Develop and deploy quantitative models that demonstrate positive benefit-cost ratios for resilience investments, creating reproducible data pipelines and analysis workflows that have been successfully adopted by practicing engineers and policymakers.
- Spearhead behavioral research initiatives through experimental survey design, data collection, and analysis; build and evaluate AI-assisted human-in-the-loop systems to efficiently process qualitative data for economic and policy insights.
- For FY25: Successfully secured competitive funding for two data-driven research proposals from NIST Research Protections Office; designed innovative survey instruments and analytical frameworks to quantitatively assess organizational policy impacts.
- FY22-FY23: Served as Analyst in NIST Director's Office, developing interactive data visualization dashboards; facilitated cross-functional data governance initiatives; represented NIST in Department and interagency working groups to advance evidence-based decision making.

Publications (peer-reviewed)

1. Zhang, Y., Fung, J. F., Cook, D., Johnson, K. J., & Sattar, S. (2024). Benefit–cost analysis for earthquake-resilient building design and retrofit: State of the art and future research needs. *Natural Hazards Review*, *25*(3), 03124001. https://doi.org/10.1061/NHREFO.NHENG-1910

2. Li, Z., Mao, A., Stephens, D., Goel, P., Walpole, E., Dima, A., Fung, J. F., & Boyd-Graber, J. (2024). Improving the TENOR of labeling: Re-evaluating topic models for content analysis. In Y. Graham & M. Purver (Eds.), *Proceedings of the 18th conference of the european chapter of the association for computational linguistics (volume 1: Long papers)* (pp. 840–859). Association for Computational Linguistics. https://aclanthology.org/2024.eacl-long.51
3. Zhang, Y., Ayyub, B. M., Fung, J. F., & Labe, Z. M. (2024). Incorporating extreme event attribution into climate change adaptation for civil infrastructure: Methods, benefits, and research needs. *Resilient Cities and Structures*, *3*(1), 103–113. https://doi.org/10.1016/j.rcns.2024.03.002
4. Fung, J. F., Zhang, Y., Johnson, K. J., Cook, D. T., & Sattar, S. (2023). Multidisciplinary research to advance the development of functional recovery for community resilience. *Disaster Prevention and Resilience*, *2*(13). http://dx.doi.org/10.20517/dpr.2023.15
5. Zhang, Y., Fung, J. F., Johnson, K. J., & Sattar, S. (2022). Motivators and impediments to seismic retrofit implementation for wood-frame soft-story buildings: A case study in california. *Earthquake Spectra*, *38*(4), 2788–2812. https://doi.org/10.1177/87552930221100844
6. Thomas, D., & Fung, J. (2022). Measuring downstream supply chain losses due to power disturbances. *Energy Economics*, *114*, 106314. https://doi.org/10.1016/j.eneco.2022.106314
7. Zhang, Y., Fung, J. F., Johnson, K. J., & Sattar, S. (2022). Review of seismic risk mitigation policies in earthquake-prone countries: Lessons for earthquake resilience in the united states. *Journal of Earthquake Engineering*, *26*(12), 6208–6235. https://doi.org/10.1080/13632469.2021.1911889
8. Hariri-Ardebili, M. A., Sattar, S., Johnson, K., Clavin, C., Fung, J., & Ceferino, L. (2022). A perspective towards multi-hazard resilient systems: Natural hazards and pandemics. *Sustainability*, *14*(8), 4508. https://doi.org/10.3390/su14084508
9. Helgeson, J. F., Aminpour, P., Fung, J. F., Henriquez, A. R., Zycherman, A., Butry, D., Nierenberg, C., & Zhang, Y. (2022). Natural hazards compound COVID-19 impacts on small businesses disproportionately for historically underrepresented group operators. *International Journal of Disaster Risk Reduction*, *72*, 102845. https://doi.org/10.1016/j.ijdrr.2022.102845
10. Zhang, Y., Ayyub, B. M., & Fung, J. F. (2022). Projections of corrosion and deterioration of infrastructure in united states coasts under a changing climate. *Resilient Cities and Structures*, *1*(1), 98–109. https://doi.org/https://doi.org/10.1016/j.rcns.2022.04.004
11. Fung, J. F., Sattar, S., Butry, D. T., & McCabe, S. L. (2021). The total costs of seismic retrofits: State of the art. *Earthquake Spectra*, *0*(0), 87552930211009522. https://doi.org/10.1177/87552930211009522
12. Helgeson, J. F., Fung, J. F., & Roa-Henriquez, A. R. (2020). Rationally bounded in a storm of complex events: Small businesses facing natural hazard resilience during a pandemic. *Journal of Behavioral Economics for Policy*, *4*(S3), 55–65. https://ideas.repec.org/a/beh/jbepv1/v4y2020is3p55-65.html
13. Fung, J. F., & Hsu, C.-L. (2021). A cumulative offer process for supply chain networks. *Review of Economic Design*, *25*(1). https://doi.org/10.1007/s10058-020-00238-z

14. Fung, J. F., Helgeson, J. F., Webb, D. H., O'Fallon, C. M., & Cutler, H. (2020). Does resilience yield dividends? Co-benefits of investing in increased resilience in cedar rapids. *Economic Systems Research*, 1–27. https://doi.org/10.1080/09535314.2020.1798359
15. Fung, J. F., Sattar, S., Butry, D. T., & McCabe, S. L. (2020). A predictive modeling approach to estimating seismic retrofit costs. *Earthquake Spectra*, *36*(2), 579–598. https://doi.org/10.1177/8755293019891716
16. Lindt, J. van de, Peacock, W., Mitrani-Reiser, J., Rosenheim, N., Deniz, D., Dillard, M., Tomiczek, T., Graettinger, A., Crawford, P., Harrison, K., Barbosa, A., Tobin, J., Helgeson, J., Peek, L., Memari, M., Sutley, E., Hamideh, S., Gu, D., Cauffman, S., & Fung, J. (2020). *Community resilience-focused technical investigation of the 2016 lumberton, north carolina flood: An interdisciplinary approach*.
17. Johnson, K. J., Fung, J. F., McAllister, T. P., McCabe, S. L., Sattar, S., & Segura Jr, C. L. (2020). Social and economic components of resilient multihazard building design. *Natural Hazards Review*, *21*(1), 6019002.

Publications (other)

1. Roa-Henriquez, A., Fung, J. F., Abud, R., Helgeson, J., & Thomas, D. (2025). Causal machine learning: An empirical approach to supply chain management. In *Digital transformation of the supply chain* (p. (Accepted)). Springer.
2. Fung, J. F., Li, Z., Stephens, D., Mao, A., Goel, P., Walpole, E., Dima, A. A., & Boyd-Graber, J. (2024). *Human-in-the-loop technical document annotation: Developing and validating a system to provide machine-assistance for domain-specific text analysis*. Technical Note (NIST TN), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.TN.2287
3. Zhang, Y., Sattar, S., Cook, D., Johnson, K., & Fung, J. (2024). *Systematic review of embodied carbon assessment and reduction in building life cycles*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1324
4. Thomas, D., & Fung, J. (2023). *Power disturbances: An examination of short-term losses in the downstream supply chain*. AEA Conference, New Orleans, LA, US. https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=935956
5. Fung, J., Sattar, S., Butry, D., & McCabe, S. (2020). *Machine learning methods for predicting seismic retrofit costs*. Proceedings of the 17th World Conference on Earthquake Engineering, Sendai,. https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=929595
6. Fung, J., Helgeson, J., O'Fallon, C., Webb, D., & Cutler, H. (2019). *Quantifying macroeconomic resilience dividends in cedar rapids*. The 27th International Input-Output Association Conference, Glasgow, -1. https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=927870
7. Fung, J., Sattar, S., Butry, D., & McCabe, S. (2019). *Selecting building characteristics to predict seismic retrofit costs of a building portfolio*. Proceedings of the 2nd Annual Conference on Natural Hazards & Infrastructure, Chania, -1. https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=927227

8. Fung, J., Butry, D., Sattar, S., & McCabe, S. (2018). *Cost estimates for the seismic retrofit of federally owned and leased buildings*. Proceedings of the 11th National Conference in Earthquake Engineering, Los Angeles, CA. https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=924676
9. Helgeson, J., Fung, J., O'Fallon, C., Webb, D., & Cutler, H. (2017). *Identifying and quantifying the resilience dividend using computable general equilibrium models: A methodological overview*. Identifying; Quantifying the Resilience Dividend using Computable General Equilibrium Models: A Methodological Overview, Brussels, -1. https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=924427
10. Fung, J., Zhang, Y., Johnson, K., Cook, D., & Sattar, S. (2022). *A framework to evaluate the cost-effectiveness of recovery-based design*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1277
11. Helgeson, J., Fung, J., Henriquez, A. R., Zycherman, A., Mohammadabadi, P. A., Nierenberg, C., Butry, D., & Ramkissoon, D. (2021). *Eliciting lessons from small- and medium-sized enterprises for resilience during and following complex events: Longitudinal data collection (wave 2)*. Data Collection Instruments, National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.DCI.003
12. Helgeson, J., Fung, J., Henriquez, A. R., Zycherman, A., Nierenberg, C., Butry, D., Ramkissoon, D., & Zhang, Y. (2021). *Longitudinal study of complex event resilience of small- and medium-sized enterprises: Natural disaster planning and recovery during the COVID-19 pandemic (wave 2)*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1267
13. Helgeson, J., Fung, J., Roa, A., Zycherman, A., Butry, D., Nierenberg, C., Zhang, Y., & Ramkissoon, D. (2020). *Respondent summary report business survey: COVID-19 impacts and recovery in the context of complex events*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1264
14. Helgeson, J., Fung, J., Zhang, Y., Roa, A., Zycherman, A., Nierenberg, C., Butry, D., & Ramkissoon, D. (2020). *Eliciting lessons from small- and medium-sized enterprises (SMEs) for natural disaster resilience planning and recovery during the COVID-19 pandemic: SME complex event resilience*. Other, National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.DCI.002
15. Helgeson, J., Fung, J., Roa, A., Zhang, Y., Zycherman, A., Nierenberg, C., Butry, D., & Ramkissoon, D. (2020). *Complex event resilience of small- and medium-sized enterprises: Natural disaster planning during the COVID-19 pandemic*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1258
16. Helgeson, J., Fung, J., Roa, A., Zhang, Y., Zycherman, A., Nierenberg, C., Butry, D., & Ramkissoon, D. (2020). *Complex event resilience of small- and medium-sized enterprises: Natural disaster planning during the COVID-19 pandemic briefing document*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1259

17. Gilbert, S., Helgeson, J., Webb, D., Fung, J., & Kandaswamy, A. (2020). *Associating disaster deaths with risk profiles*. Technical Note (NIST TN), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.TN.2115
18. Lindt, J. van de, Peacock, W., Mitrani-Reiser, J., Rosenheim, N., Deniz, D., Dillard, M., Tomiczek, T., Koliou, M., Graettinger, A., Crawford, P., Harrison, K., Barbosa, A., Tobin, J., Helgeson, J., Peek, L., Memari, M., Sutley, E., Hamideh, S., Gu, D., … Fung, J. (2018). *The lumberton, north carolina flood of 2016: A community resilience focused technical investigation*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1230
19. Helgeson, J., Fung, J., O'Fallon, C., Webb, D., & Cutler, H. (2018). *A computable general equilibrium model of cedar rapids*. Technical Note (NIST TN), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.TN.2029
20. Sattar, S., McAllister, T., Johnson, K., Clavin, C., Segura, C., McCabe, S., Fung, J., Abrahams, L., Emily, Levitan, M., Harrison, K., & Harris, J. (2018). *Research needs to support immediate occupancy building performance following natural hazard events*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1224
21. Fung, J., Butry, D., Sattar, S., & McCabe, S. (2018). *Estimating structural seismic retrofit costs for federal buildings*. Technical Note (NIST TN), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.TN.1996
22. Thomas, D., Butry, D., Gilbert, S., Webb, D., & Fung, J. (2017). *The costs and losses of wildfires*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.SP.1215
23. Fung, J., Butry, D., Sattar, S., & McCabe, S. (2017). *A methodology for estimating seismic retrofit costs*. Technical Note (NIST TN), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.TN.1973
24. Fung, J., & Helgeson, J. (2017). *Defining the resilience dividend: Accounting for co-benefits of resilience planning*. Technical Note (NIST TN), National Institute of Standards; Technology, Gaithersburg, MD. https://doi.org/https://doi.org/10.6028/NIST.TN.1959
25. Butry, D. T., Thomas, D., & Fung, J. F. (2021). Resilience economics and risk management. In B. M. Ayyub (Ed.), *Hazard-resilient infrastructure: Analysis and design*. American Society of Civil Engineers Reston, VA; American Society of Civil Engineers.

Leadership, activities, and other skills

Leadership: Earthquake Engineering Research Institute (EERI): Co-chair, Learning From Earthquakes (LFE) Business Resilience Subcommittee.

Professional Organizations: American Economic Association (AEA); American Society of Civil Engineers (ASCE); Earthquake Engineering Research Institute (EERI).

Mentoring: Formal mentoring through NIST Mentoring Program (2023, 2024). Informal mentoring through NIST academic programs (GMSE, SURF, PREP).

Programming: R, Julia, Python, SQL. Instructor for NIST Software Carpentry. Lesson main-

tainer for Data Carpentry.

Languages: English (fluent), Spanish (native).

Clubs: NIST Toastmasters Club; Association of NIST Hispanic Americans; NIST Community Building Group.