

# Juan F. Fung

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## Education

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### University of Illinois

*PhD Economics, MS Statistics*

- Dissertation: “Three Essays in Applied Market Design”

**Urbana-Champaign, IL**

*August 2016*

### University of Missouri-St. Louis

*MS Economics*

**St. Louis, MO**

*May 2008*

### New York University

*BA Economics*

**New York, NY**

*May 2003*

## Employment

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### National Institute of Standards and Technology

*Economist - Applied Economics Office*

**Gaithersburg, MD**

*September 2016 - present*

- Economic research and project management, including developing project plans, milestones, deliverables, and budgets; coordinating interdisciplinary research teams and external collaborations with academia, industry, and government; status reports and briefings for program reviews; and ideation and design of new research projects.
- Project portfolio includes development of econometric, machine learning, computational, and survey methods for the economic evaluation of disaster risk reduction policies and investments, as well as applications of Natural Language Processing (NLP) for human-in-the-loop analysis of technical text.
- Mentoring undergraduate interns, graduate students, and post-doctoral scholars, with diverse backgrounds (physics, engineering, statistics, computer science), as well as building and maintaining university partnerships.
- For FY25: Awarded two project proposals funded by NIST Research Protections Office (RPO) to conduct evaluations of RPO policies, processes, and practices.
- FY22-FY23: Detail to Director’s Office as Analyst included: development and deployment of internal dashboard; internal engagement with staff, management, and leadership; and external engagement with Department and interagency data working groups.

## Publications (peer-reviewed)

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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/NHREF0.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.ijdr.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)

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1. 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>
2. 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>
3. 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](https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=935956)
4. 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](https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=929595)
5. 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](https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=927870)
6. 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](https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=927227)
7. 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](https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=924676)

8. 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](https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=924427)
9. 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>
10. 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>
11. 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>
12. 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>
13. 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>
14. 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>
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 briefing document*. Special Publication (NIST SP), National Institute of Standards; Technology, Gaithersburg, MD. <https://doi.org/https://doi.org/10.6028/NIST.SP.1259>
16. 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>

17. 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>
18. 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>
19. 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>
20. 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>
21. 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>
22. 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>
23. 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>
24. 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

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**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 maintainer for Data Carpentry.

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

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