

Michael Cary

DEPARTMENT OF AGRICULTURAL AND APPLIED ECONOMICS, VIRGINIA TECH
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Academic Appointments

Research Assistant Professor

DEPARTMENT OF AGRICULTURAL AND APPLIED ECONOMICS, VIRGINIA TECH

May 2023 - Present

Blacksburg, VA

Education

Ph.D. Natural Resource Economics

WEST VIRGINIA UNIVERSITY

Dissertation: The Economics of Pollution: Policy, Productivity, and the Structure of Road Networks

2023

Morgantown, WV

M.A. Economics

VIRGINIA STATE UNIVERSITY

2014

Petersburg, VA

B.A. History

VIRGINIA COMMONWEALTH UNIVERSITY

2011

Richmond, VA

Research Interests

The Human-Environment Nexus, Population Studies, Applied Machine Learning, Network Theory

Awards

Westarctica Conservation Scholarship

DISSERTATION AWARD

2022

Professional Service

Reaching Regions

MEMBER - EDITORIAL BOARD

2023 - Present

Journal of Crop Improvement

MEMBER - EDITORIAL BOARD

2024 - Present

AfricArXiv

SUBMISSIONS MODERATOR

2019 - 2023

Publications

Journal Articles

[33] Bennett, E., & **Cary, M.** (2025). The Golden Ticket: Examining the Impact of Winning the Western States Endurance Run Lottery on Subsequent Ultramarathon Performance and Travel Decisions. *Journal of Sports Economics*, in press.

[32] **Cary, M.** (2025). Post-Kyoto emissions in the United States. *Renewable and Sustainable Energy Reviews*, 209, 115068.

[31] **Cary, M.** (2025). A note proving the nullity of block graphs is unbounded. *Discrete Mathematics*, 348(2), 114289.

[30] **Cary, M.** & Stephens, H. M. (2025). How COVID-19 Affected Participation in Ultramarathons: Gender, Risk Aversion, and Travel. *Journal of Sports Economics*, 26(1), 55-77.

[29] Prabhu, S., Nisha, Y. S., **Cary, M.**, Arulperumjothi, M., & Qi, X. (2024). On Detour Index of Join of Hamilton-connected Graphs. *Ars Combinatoria*, 160, 195-203.

- [28] **Cary, M.** (2024). Herding and investor sentiment after the cryptocurrency crash: evidence from Twitter and natural language processing. *Financial Innovation*, 10, 142.
- [27] **Cary, M.** & Stephens, H. (2024). Economic, Environmental, and Technical Gains from the Kyoto Protocol: Evidence from Cement Manufacturing. *Resources Policy*, 91, 104926.
- [26] **Cary, M.** (2023). Climate policy boosts trade competitiveness: Evidence from timber trade networks. *Renewable and Sustainable Energy Reviews*, 188, 113869.
- [25] **Cary, M.** (2023). Core-periphery models via integer programming: Maximizing the influence of the core. *Computational and Applied Mathematics*, 42(4), 162.
- [24] **Cary, M.** & Stephens, H. (2023). Gendered Consequences of COVID-19 Among Professional Tennis Players. *Journal of Sports Economics*, 24(2), 241-266.
- [23] **Cary, M.** & Ahmed, Z. (2022). Do heavy-duty and passenger vehicle emissions standards reduce per capita emissions of oxides of nitrogen? Evidence from Europe. *Journal of Environmental Management*, 320, 115786.
- [22] Haggerty, T., Stephens, H., Peckens, S., Bodkins, E., **Cary, M.**, Dino, G., & Sedney, C. (2022). Telemedicine versus in-person primary care: impact on visit completion rate in a rural Appalachian population. *Journal of the American Board of Family Medicine*, 35(3), 475-484.
- [21] Ahmed, Z., **Cary, M.**, Ali, S., Murshed, M., Ullah, H., & Mahmood, H. (2022). Moving toward a green revolution in Japan: Symmetric and asymmetric relationships among clean energy technology development investments, economic growth, and CO2 emissions. *Energy & Environment*, 0958305X211041780.
- [20] **Cary, M.** (2021). Down with the #Dogefather: Evidence of a Cryptocurrency Responding in Real Time to a Crypto-Tastemaker. *Journal of Theoretical and Applied Electronic Commerce Research*, 16(6), 2230-2240.
- [19] Ahmed, Z., **Cary, M.**, Shahbaz, M., & Vo, X.V. (2021). Asymmetric nexus between economic policy uncertainty, renewable energy technology budgets, and environmental sustainability: Evidence from the United States. *Journal of Cleaner Production*, 127723.
- [18] **Cary, M.** & Bekun, F. (2021). Democracy and Deforestation: The Role of Spillover Effects. *Forest Policy and Economics*, 125, 102398.
- [17] **Cary, M.** (2021). Dominator Chromatic Numbers of Orientations of Trees. *Open Journal of Discrete Applied Mathematics*, 4(1), 4-11.
- [16] **Cary, M.**, Cary, J., & Prabhu, S. (2021). Independent Domination in Directed Graphs. *Communications in Combinatorics and Optimization*, 6(1), 67-80.
- [15] Ahmed, Z., **Cary, M.** & Le, H.P. (2021). Accounting asymmetries in the long-run nexus between globalization and environmental sustainability in the United States: An aggregated and disaggregated investigation *Environmental Impact Assessment Review*, 86, 106511.
- [14] Ahmed, Z., Zhang, B. & **Cary, M.** (2021). Linking economic globalization, economic growth, financial development, and ecological footprint: Evidence from symmetric and asymmetric ARDL. *Ecological Indicators*, 121, 107060.
- [13] Frey, G. & **Cary, M.** (2020). Under what management and policy scenarios can alley cropping be a competitive alternative in the United States Southeast? *Agroforestry Systems*, 94(6), 2167-2183.
- [12] **Cary, M.** & Frey, G. (2020). Alley cropping as an alternative under changing climate and risk scenarios: A Monte-Carlo simulation approach. *Agricultural Systems*, 185, 102938.
- [11] **Cary, M.** (2020). A Linear Algorithm for Minimum Dominator Colorings of Orientations of Paths. *Engineering and Applied Science Letters*, 3(3), 10-14.
- [10] **Cary, M.** (2020). Dominator Colorings of Digraphs. *Open Journal of Discrete Applied Mathematics*, 3(2), 50-67.
- [9] Prabhu, S., Murugan, G., **Cary, M.**, Arulperumjothi, M., & Liu, J. (2020). On Certain Distance and Degree Based Topological Indices of Zeolite LTA Frameworks. *Materials Research Express*, 7(5), 055006.
- [8] **Cary, M.** & Rockwell, T. (2020). International Collaboration in Open Access Publications: How Income Shapes International Collaboration. *Publications*, 8(1), 13.
- [7] **Cary, M.** (2020). Molecules of Inefficiency: How tariffs impact carbon intensities, carbon dioxide emissions, and the environment. *Science of The Total Environment*, 136531.
- [6] **Cary, M.** (2020). Have Greenhouse Gas Emissions from US Energy Production Peaked? State Level Evidence from Six Subsectors. *Environment Systems and Decisions*, 40(1), 125-134.
- [5] **Cary, M.** (2020) Cycle intersection graphs and minimum decycling sets of even graphs. *Discrete Mathematics, Algorithms and Applications*.
- [4] **Cary, M.** (2019). Increasing Access to Clean Fuels and Clean Technologies: A Club Convergence Approach. *Clean Technologies*, 1(1), 247-264.

- [3] **Cary, M.** (2019). Vertices with the second neighborhood property in Eulerian digraphs. *Opuscula Mathematica*, 39(6) 765-772.
- [2] **Cary, M.** (2018). Perfectly regular and perfectly edge-regular fuzzy graphs. *Annals of Pure and Applied Mathematics*, 16(2), 461-469.
- [1] **Cary, M. A.,** Frey, G. E., & Mercer, D. E. (2014). The value of versatile alley cropping in the Southeast US: A Monte Carlo simulation. In: *Proceedings of the Inaugural Symposium of the International Society of Forest Resource Economics*, 6-11.

US Forest Service Technical Reports

- [1] Frey, G. E., **Cary, M. A.,** Goodwin, B. K., & Mercer, D. E. (2018). Agroforestry land-use economic yield and risk (ALLEY) model 2.0: a computer suite to simulate and compare stochastic yield and returns of alley crop, monocrop, and pine plantation systems in the US. e-Gen. Tech. Rep. SRS-235. Asheville, NC: US Department of Agriculture Forest Service, Southern Research Station. 235, 1-35.

Other Publications

- [1] Justin Sègbédji Ahinon, Hisham Arafat, Umar Ahmad, Joyce Achampong, Osman Aldirdiri, Obasegun Tekena Ayodele, Luke Okelo, Louise Bezuidenhout, **Michael Cary**, Nada Fath, Nabil Aziz Ksibi, Fayza Nasr, Carine Nguemeni, Mahmoud Bukar Maina, Priscilla Mensah, Johanssen Obanda, Joy Owango, Ahmed Ogunlaja, Gregory Simpson, Johanna Havemann. (2020). AfricArXiv–the pan-African Open Scholarly Repository. *AfricArXiv*.

Book Reviews

- [1] **Cary, M.** Review of Céline Rozenblat and Zachary P. Neal, 2021 Handbook of Cities and Networks. Edward Elgar Publishing Limited: Cheltenham, UK. ISBN: 9781788114707, 651 pp., \$340. *The Review of Regional Studies* (2022) 52, 274–282.

Presentations

North American Regional Science Conference

ENVIRONMENTAL CONSEQUENCES OF JOB GROWTH: A STUDY OF LAND USE DYNAMICS

2024

New Orleans, LA

North American Regional Science Conference

ESTIMATING THE EFFECT OF A UTILITY-SCALE SOLAR FACILITY ON HOUSE PRICES

2024

New Orleans, LA

Missouri Valley Economic Association Conference

THE GOLDEN TICKET: EXAMINING THE IMPACT OF WINNING THE WESTERN STATES ENDURANCE RUN LOTTERY ON SUBSEQUENT ULTRAMARATHON PERFORMANCE AND TRAVEL DECISIONS

2024

Kansas City, MO

Appalachian Translational Research Network Annual Health Summit

JOB GROWTH REDUCES OPIOID OVERDOSES

2024

Abingdon, VA

Southern Regional Science Association Conference

TIME ZONES, PRODUCTIVITY, AND DISCONTINUITIES IN THE SPATIAL (Dis)EQUILIBRIUM

2024

Washington, DC

North American Regional Science Conference

DESIGNING GEOSPATIAL AND REGIONAL SCIENCE TOOLS FOR VIRGINIA COOPERATIVE EXTENSION

2023

San Diego, CA

Southern Regional Science Association Conference

AMBIENT AIR POLLUTION AND PHYSICAL PRODUCTIVITY: EVIDENCE FROM ULTRAMARATHONS

2023

Savannah, GA

Mid-Continent Regional Science Association Conference

DOES ROAD NETWORK STRUCTURE AFFECT POLLUTION STOCKS AND FLOWS? EVIDENCE FROM ROAD CLOSURES IN VIRGINIA

2022

Virtual

Southern Regional Science Association Conference

DOES ROAD NETWORK STRUCTURE AFFECT POLLUTION STOCKS AND FLOWS? EVIDENCE FROM ROAD CLOSURES IN VIRGINIA

2022

Austin, TX

North American Regional Science Conference

AMBIENT AIR POLLUTION AND PHYSICAL PRODUCTIVITY: EVIDENCE FROM ULTRAMARATHONS

2021

Denver, CO

WVU Division of Resource Economics and Management Seminar

ECONOMIC, ENVIRONMENTAL, AND TECHNICAL GAINS FROM THE KYOTO PROTOCOL: EVIDENCE FROM CEMENT MANUFACTURING

2020

Morgantown, WV

Grants

- [4] Chen, S. (PI), **Cary, M.**, Alwang, J., Holt, M., Holmes, C., Gupta, A., Posadas, B. "Internship in Data Analytics in Agriculture, Community, and Rural Economics (DATA-ACRE)", USDA NIFA, (2022-01-15 – 2027-01-14), \$748,412.
- [3] Ortey, M., **Cary, M.**, and Wang, L. (2025). "Flourishing Main Street Buena Vista: Thriving community through thriving businesses", Main Street Buena Vista, \$10,000.
- [2] Ortey, M., **Cary, M.**, and Wang, L. (2025). "Data-Science for grain marketing decision making: Planting progress and Crop Condition Interactive Dashboard", Virginia Corn Board, \$10,000.
- [1] Easton, Z. (PI), White, R., Mercadante, V., Jacobs, L., Pent, G., Golightly, W., Stewart, R., Mehrizi-Sani, A., **Cary, M.**, Stallknecht, E., Fike, J., Chen, Z., and Ignosh, J., (2024-2025). "Sungrazers: Piloting Agri-photovoltaic Solutions for Sustainable Ruminant Production Systems", Virginia Tech Pratt Equipment Fund, \$150,000.

Teaching Experience

AAEC 4324/5244 - Rural and Regional Development Policy
VIRGINIA TECH

Fall 2023

ARE 150 - Introductory Agricultural and Agribusiness Economics
WEST VIRGINIA UNIVERSITY

Spring 2023

ARE 150 - Introductory Agricultural and Agribusiness Economics
WEST VIRGINIA UNIVERSITY

Spring 2022

Advising

Gabe Wiggins, Agricultural and Applied Economics, M.S., Expected 2026.

Professional Affiliations

North American Regional Science Association, Southern Regional Science Association, Agricultural and Applied Economics Association, Southern Agricultural Economics Association, International Society for Forest Resource Economics

Computer Skills

Software Python, R, Matlab, Stata, Julia, GAMS, \LaTeX , Markdown, Alteryx, Tableau
Skills Statistical Analysis, GIS, Machine Learning, Network Analysis, Textual Analysis/NLP, Web Scraping, Simulation, Mathematical Programming, Data Management, Data Processing, Data Visualization, Dashboard Development

Industry Experience

Data Scientist
MYLAN (PRE-MERGER) / VIATRIS (POST-MERGER)

2019 - 2021
Morgantown, WV

Data Scientist
WVU CENTER FOR ALTERNATIVE FUELS, ENGINES, AND EMISSIONS

2017 - 2019
Morgantown, WV

Co-Founder
MORGANTOWN FERAL AND STRAY CATS

2015 - 2018
Morgantown, WV