Alireza Marahel, Ph.D.

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SUMMARY

Economics Ph.D. with specialization in econometrics, machine learning, and finance; proficient in programming, Python/Matlab, adept at leveraging large datasets for forecasting and policy analysis. Seeking full-time work in the industry starting August 2024.

EDUCATION

Doctor of Philosophy, Economics   Sep 2018 – July 2024 (Expected)
Indiana University, *Bloomington, IN, USA*
• Dissertation: "Bridging Econometrics and Machine Learning: Essays on Finance and Macroeconomics"

Bachelors of Science, Mechanical Engineering (*Minor in Economics*)   Sep 2013 – May 2018
Sharif University of Technology, *Tehran, Iran*

EXPERIENCE

Associate Instructor and Teaching Assistant, Department of Economics, *Indiana University*   2019 – Present
• Courses: Business Statistics, Intro to Applied Microeconomics, Fundamentals of Economics I & II

McKinney Climate Fellow, Office of Sustainability, *City of Indianapolis*   2023
• Developed a community-wide greenhouse gas inventory for the City of Indianapolis using ICLEI ClearPath.
• Identified, categorized, and analyzed emissions sources across sectors and scopes, in preparation for CDP (Carbon Disclosure Project) reporting.
• Led sessions and streamlined communications with government agencies, industries, and local government officials to ensure the efficient collection of relevant data and foster collaborative relationships.

International Monetary Fund (IMF) Fund Internship Program, *International Monetary Fund*   2021
• Developed a framework to assess the tax capacity, identify its key determinants, and estimate tax revenue gaps/inefficiency in the Middle East and Central Asia countries, using a stochastic tax frontier model for panel data with time-variant inefficiency.
• Composed report sections and presented research findings within the IMF's MCD department, contributing to the methodological and empirical foundation that, through collaborative efforts with a team of economists, led to the subsequent publication.

SELECTED RESEARCH PROJECTS

Specialties: Financial Econometrics, Machine Learning, Quantitative Economics

Title: "Evaluating Asset Pricing Models Under Endogenous Regime Switching"
• Developed a new approach to model panel regression with endogenous regime switching using an autoregressive latent factor.
• Performed extensive maximum likelihood estimation and non-linear regularized regressions to identify the macroeconomic risk factors determining the state of the market, captured by constructing portfolios using stock excess returns, through IU supercomputing systems, Slurm batch processing, and programming in MATLAB and Python.
• Showcased that allowing Capital Asset Pricing Model (CAPM) betas to dynamically adjust to market conditions significantly elevates model's predictiveness in high volatility regimes.

Title: "On the Effectiveness of LSTM Models in Predicting Inflation Rates"
• Examined the predictive performance of Long-Short Term Memory (LSTM), a recurrent neural network model, to forecast the U.S. inflation rate using the FRED-MD data set, by employing parallel computing techniques to enhance computational efficiency.
• Forecasted inflation using traditional time-series and various supervised machine learning models and compared their out-of-sample forecasting accuracy to LSTMs.
• Developed an algorithm to obtain near-optimal initial values for LSTMs that significantly enhances their predictive accuracy.

Title: "Evaluating Alternative Designs for Carbon Border Adjustment Mechanisms"
• Analyzed welfare and emissions impacts of different carbon border adjustment mechanism (CBAM) designs when a country unilaterally imposes carbon pricing using a quantitative multi-country, multi-sector general equilibrium model.
• Calibrated with data on trade, production, emission, and environmental taxes from WIOD, UNCTAD, EUROSTAT, and OECD-PINE.
• Proposed a CBAM policy that yields 11 billion USD gains for the European Union and 246 billion globally.

SKILLS SUMMARY

Programming: Python (TensorFlow, PyTorch, Scikit-Learn), MATLAB, R, Stata, Parallel Computing, High-Performance Computing (HPC), Unix, C/C++, SQL, PySpark, Excel (VBA)

Workflow Experience: Jupyter Notebook, Slurm Workload Manager, Slate, Github, AWS, Hugging Face