Tyler J. Pike

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Website ∘ SSRN ∘ Google Scholar ∘ GitHub

Education

2018-2020	**Harvard University, Harvard Extension School**	Cambridge, MA
	Non-degree graduate student in Mathematics and Statistics	

2014–2018	**University of Richmond**	Richmond, VA
	Bachelor of Science in Mathematical Economics, magna cum laude	

- University of Edinburgh, Scotland, United Kingdom (Spring 2017)
- Activities: Mock Trial (Treasurer, Varsity Captain), NXG Investment Fund, Writing Consultant

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Experience

2018-Present	**Board of Governors of the Federal Reserve**	Washington, DC

Special Appointment as Research Assistant to Vice Chair Clarida (2020–Present)

- Prepare detailed analysis covering monetary policy topics such as FOMC communications, prescriptive policy rules, and estimating inflation expectations for Vice Chair Clarida

Senior Research Assistant (2018–Present)
Research and Policy

- Co-authoring 5 academic papers dealing with macro-financial and econometric topics such as bank lending standards, corporate risk, economic forecasting, and machine learning based impulse responses
- Co-authored 3 internal policy memos and 1 technical primer
- Presented original research at 5 Macro-Financial Seminars and 1 international academic conference
- Acted as lead RA on four high-profile policy products, including the June 2019 Monetary Policy Report to Congress and the Jan. 2020 Tealbook
- Received the Spring 2020 Division Director's Award for Excellence

Other Roles

- Serving on the leadership subcommittee of the Board-wide committee to redesign RA training
- Serving as co-instructor for MA University, teaching technical skills to a class of new research assistants, technology analysts, and financial analysts

Summer 2017	**Federal Reserve Bank of Chicago**	Chicago, IL
	Economic Research Intern	

- Supported the Financial Markets group, with a focus on central counterparties and systemic risk

2015–2018	**University of Richmond**	Richmond, VA
	Economic Research Fellow (Summer 2016)	

- Presented independent research about the interaction of technology and migrants' financial behavior at the Federal Reserve Bank of Dallas and the University of Richmond

Economic Research Assistant (2015–2018)

- Built databases and programmed statistical analysis contributing to academic articles about international trade, labor, and technology
- Tutored students in macroeconomics and guest lectured a class of 30 students on financial markets

Technology Skills (See GitHub for projects and packages)

Primary Tools: Git, LaTeX, SQL, R, Python, Unix

Additional Tools: Java, Matlab, Microsoft Office, Stata, SAS

Concepts: Machine learning, Natural language processing, Distributed and parallel computing

Teaching Experience

University of Richmond

- Writing consultant: assisted undergraduate and graduate students in constructing and organizing arguments for academic papers (2016 - 2018)
- Economics teaching assistant: tutored students in Dr. Andrea Waddle's macroeconomic class and hosted supplementary lectures on financial markets (2017 - 2018)

Federal Reserve Board

- FedEd: taught high schoolers about economics and personal finance (2018-2019)
- Howard University's Data Analysis and Financial Literacy in R: taught undergraduate programming and data analysis skills (2019-2020)
- MA University: taught new Federal Reserve Board employees data management and programming (2020)

Research (See website for details and updates)

Working Papers and Works in Progress

1. Combining forecasts: Can machines beat the average?
   Coauthored with Francisco Vazquez-Grande **(Submitted)**
   Abstract: Yes. This paper documents the benefits of combining forecasts using weights built with non-linear models. We introduce our tree-based forecast combinations and compare them with benchmark equal weight combination as well as other nonlinear forecast weights. We find that nonlinear models can improve consistently upon the equal weight alternative–breaking the so-called "forecast combination puzzle"–and that our proposed methods compete well with other nonlinear methods.

2. Bottom-up leading macroeconomic indicators: An application to non-financial corporate defaults using machine learning
   Coauthored with Horacio Sapriza, and Tom Zimmermann **(Submitted)**
   Abstract: This paper constructs a leading macroeconomic indicator from microeconomic data using recent machine learning techniques. Using tree-based methods, we estimate probabilities of default for publicly traded non-financial firms in the United States. We then use the cross-section of out-of-sample predicted default probabilities to construct a leading indicator of non-financial corporate health. The index predicts real economic outcomes such as GDP growth and employment up to eight quarters ahead. Impulse responses validate the interpretation ¿ of the index as a measure of financial stress.

3. Estimation and Inference of Impulse Responses with Random Forests
   Coauthored with Francisco Vazquez-Grande
   Abstract: This paper introduces methods to estimate and conduct inference on impulse responses without specification and estimation of the underlying system, which are particularly suited in the presence of a nonlinear structure. We use flexible machine learning techniques to estimate response values at each horizon of interest, as it is done with local projections. The advantages of our tree-based method over traditional available methods to estimate impulse responses are the following: (1) they automatically estimate nonlinear specifications without having to postulate a specific nonlinear model; (2) they allow for the inclusion of a large number of covariates that far exceed the limits of linear models; (3) they are more robust to model misspecification; (4) they can estimate asymmetric impulses based on the sign and magnitude of a shock. We present Monte Carlo evidence and applications to a simple models that make these advantages apparent.

4. A tree-based model to evaluate the determinants of changes in bank lending standards in the U.S.
   Coauthored with Horacio Sapriza
   Abstract: We study the determinants of changes in bank lending standards for commercial and industrial loans in the United States by applying a combination of tree-based and standard econometric analysis to confidential bank-level data from the quarterly U.S. senior loan officer opinion survey (SLOOS) from 1990 to 2020. We identify three main drivers of changes in bank lending standards: Risk appetite, proxied by the VIX, competition pressures in the banking sector, proxied by the average spread between deposit rates and the federal funds rate, and banks' balance sheet health and related expected default losses in loan portfolios, proxied by the annual growth in bank-level non-accruing loans and leases. We explore the non-linear relationship of each determinant with bank-level changes in lending standards, and the relative time-varying contribution of each determinant to aggregate changes in bank lending standards. Finally, our tree-based model anticipated the tightening of bank lending standards during the Covid-19 pandemic crisis.

5. Credit Supply Shocks and the Macroeconomy: The Predictive and Causal Role of Bank Lending Standards
   Coauthored with Elijah Broadbent and Horacio Sapriza
   Abstract: We construct bank credit supply indicators for the four major loan categories in the United States using changes in lending standards from bank-level responses to the Federal Reserve's Senior Loan Officer Opinion Survey on Bank Lending Practices, adjusted for macroeconomic and bank-specific factors that affect loan demand. We evaluate the ability of these indicators to predict economic activity and estimate the effect of unit shocks to these indicators on economic activity and monetary policy rates. First, we find that credit supply indicators for business loans generally provide more out-of-sample predictive information for economic activity than the indicators for household loans. Second, we find that negative shocks to the credit supply indicators decrease economic activity and monetary policy rates, particularly when applied to the commercial and industrial lending category. Third, we find that the magnitude of these effects strongly depends on the stance of monetary policy and broad financial conditions, whereas a negative shock leads to monetary policy easing and declines in economic activity when either financing conditions or the monetary policy stance are tight, but has little impact otherwise.

Non-Peer Reviewed Publications

Fed's Notes

- "Out-of-sample performance of recession probability models" with Francisco Vazquez-Grande (2019)

Policy Memos

- "Out-of-sample performance of recession probability models" with Francisco Vazquez-Grande (2019)

- "Machine Learning Recession Probability" with Francisco Vazquez-Grande (2019)

- "Building a Statistical FCI Using Partial Least Squares" with Kurt Lewis (2019)

Presentations

- "Bank Credit Supply Shocks and Economic Activity: The Role of Lending Standards" Macro-Financial Analysis Seminar, Washington, DC (2020)

- "The Fast and Frugal Tree and Recession Probabilities," Macro-Financial Analysis Seminar, Washington, DC (2020)

- "Determinants of bank lending standards in the United States,"

  - International Finance and Banking Society Conference, Medellin, Colombia (2019)
  - Macro-Financial Analysis Seminar, Washington, DC (2019)

- "Bottom-up leading macroeconomic indicators: An application to non-financial corporate defaults using machine learning," Macro-Financial Analysis Seminar, Washington, DC (2019)

- "Building a Statistical FCI Using Partial Least Squares," Macro-Financial Analysis Seminar, Washington, DC (2019)

- "Technology, Distance, and Bilateral Remittance Flows,"

  - University of Richmond Research Symposium, Richmond, VA (2018)
  - Federal Reserve Bank of Dallas' Economic Scholars Conference, Dallas, TX (2018)