Tyler J. Pike

450 Massachusetts Ave NW, Washington, DC ∘ (484) 905-1722 ∘ tjpike@umd.edu
Website ∘ SSRN ∘ Google Scholar ∘ GitHub

Education

2021–Present **University of Maryland** College Park, MD
Economics PhD Candidate

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

Experience

2018–2021 **Board of Governors of the Federal Reserve** Washington, DC
Research Assistant to Vice Chair Clarida (2020–2021)
Senior Research Assistant (2018–2021)

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

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

Technology Skills

(See GitHub for projects)

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

Additional Tools: Matlab, Microsoft Office, SAS, Stata

Software

(See GitHub for packages)

1. **OOS** for out-of-sample time series forecasting
   The OOS package introduces a structured and automated approach to out-of-sample time series forecasting, a common, important, and subtle task. In many ways, this package is merely a wrapper for the excellent extant time series forecasting routines on CRAN - including both traditional econometric time series models and modern machine learning techniques. However, this package additionally provides a modern and comprehensive set of forecast combination techniques and forecast analysis tools.
   GitHub ∘ Website ∘ CRAN

2. **sovereign** for state-dependent empirical analysis
   The sovereign package introduces a set of tools for state-dependent empirical analysis through both VAR- and local projection-based state-dependent forecasts, impulse response functions, and forecast error variance decomposition.
   GitHub ∘ Website ∘ CRAN

Research

(See website for details and updates)

Working Papers

1. Combining forecasts: Can machines beat the average?
   Coauthored with Francisco Vazquez-Grande
   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
   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.

Works in Progress

1. 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.

2. 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.

3. 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

1. "Out-of-sample performance of recession probability models" with Francisco Vazquez-Grande **FEDS Note** (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)