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Education

2021–Present **University of Maryland** College Park, MD
Doctor of Philosophy in Economics
Master of Arts in Economics awarded in spring 2023

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

Experience

2023–Present **US Census Bureau** Suitland, MD
Economist intern

2022–2023 **University of Maryland** College Park, MD
Research Assistant to John Haltiwanger
Census Bureau Special Sworn Status researcher

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

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

Technology (See GitHub for projects and packages)

Skills

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

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

Software

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, historical decompositions, and forecast error variance decompositions. Tools are also available for the estimation and analysis of Proxy-SVARs.
   GitHub ∘ Website ∘ CRAN

Research (See website for details and updates)

Publications

1. "Out-of-sample performance of recession probability models" with Francisco Vazquez-Grande **FEDS Note** (2019)

Working Papers

1. **Bank Risk Sentiment**

   Abstract: This paper evaluates the role of investor risk sentiments in the commercial bank lending market and their effect on macroeconomic outcomes. I create an empirical measure of bank risk sentiment —irrational bank-level shocks to expected loan portfolio default rates— using regulatory data covering the universe of U.S. commercial banks and an identification scheme motivated by a novel, analytical, heterogeneous bank model. Aggregate bank risk sentiment (BRS) is pessimistic during financial crises and optimistic during debt-fueled asset bubbles, but is heterogeneous at the bank-level. BRS shocks act like credit supply shocks, impacting both the extensive and intensive margins of lending. Through lending markets, a pessimistic sentiment shock leads to a significant and long-lived deterioration in economic activity and prices, prompting a monetary policy easing. I also show that BRS is equally or more important in explaining macroeconomic outcomes than corporate bond market sentiment shocks (proxied by fluctuations in the Excess Bond Premium), real shocks (including generic aggregate demand and supply shocks), and U.S. monetary policy shocks. I lastly turn to a loan-level analysis to explore the potential micro-to-macro transmission mechanisms of bank-level sentiment shocks, and show that pessimistic sentiment shocks tighten earning base borrowing constraints.

2. **Bank Lending Standards and the U.S. Economy**

   Coauthored with Huberto Ennis, Elijah Broadbent, and Horacio Sapriza

   Abstract: The provision of bank credit to firms and households affects macroeconomic performance. We use survey measures of changes in bank lending standards, disaggregated by loan category, to quantify the effect of changes in banks' attitudes toward lending on aggregate output, inflation, and interest rates. Bank lending to businesses is particularly important for macroeconomic outcomes, with peak effects on output of around half a percentage point after four quarters of the initial shock. These effects depend on the stage of the business cycle and the proximity of the short-term interest rate to its effective lower bound. The effects are larger when output is growing below trend and when the interest rate is away from its lower bound. We also find that the response of the economy to lending-standards shocks is asymmetric, with tightening shocks having larger effects on output.

Works in Progress

1. **Getting in all the Cracks: Monetary Policy, Financial Vulnerabilities, and Macro Risk**

   Coauthored with Andrea Ajello

   Abstract: We estimate the effect of monetary policy on financial vulnerabilities and the implications for macroeconomic tail risk. We first extract a small set of common factors from a large dataset of financial vulnerability indicators, estimating a factor-augmented proxy SVAR to study the response of aggregate economic activity, inflation, and financial vulnerabilities to monetary policy shocks. We then estimate the effect of changes in the financial vulnerability factors on macroeconomic tail risk via quantile regressions. We find that an unexpected monetary policy tightening can lower asset valuation vulnerabilities in the short term and slow down credit growth in the medium term. As tighter monetary policy reduces asset valuation pressures, it does so at a cost of a sizable increase in macro tail risk in the short term that is only partially offset by a modest reduction in tail risk in the medium term, induced by a slowdown in credit growth.

Pre-Doctoral Research

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.

Conferences and Workshops

2024 Summer Workshop on Money, Banking, Payments, and Finance. Washington, DC

94th Annual Southern Economics Association Meeting. Washington DC

2023 Midwest Macro Meeting. Lubbock, TX

Treasury OFR PhD symposium. Washington, DC

DC Area Macro PhD Symposium. Washington, DC

2022 53rd Annual Conference of the Money, Macro and Finance Society. Canterbury, UK

2019 International Finance and Banking Society Conference. Medellin, Colombia

Awards, Fellowships, & Grants

2023 Melville J. Ulmer Graduate Fellowship in Economics (for best second year paper)

2022 Jacob K. Goldhaber Travel Grant

International Conference Student Support Award

2021 University of Maryland Graduate Fellowship

(Federal Reserve Board) Division Director's Award for Excellence

Teaching

Instructor, Intermediate Macroeconomic Theory and Policy, University of Maryland

Teaching Assistant, Principles of Macroeconomics, University of Richmond

Professional Activities

Referee for Macroeconomic Dynamics

Organizing committee member for the 2023 DC Area Macro PhD Symposium

Participant in the 2023 Princeton Initiative