Dominik Hecker

PhD Candidate in Quantitative Economics
(expected completion: early 2026)

Research Interests

Monetary and Macroprudential Policy, Forecasting, Machine Learning

Education

since 2019 **PhD in Quantitative Economics**, Kiel University (expected early 2026)
Supervisor: Prof. Dr. Maik H. Wolters
2016–2018 **M.Sc. Economics**, University of Jena (Thesis grade: 1.0, GPA: 1.1)
2012–2016 **B.A. Sociology and Economics**, University of Jena (GPA: 1.4)

Research

Job Market Paper

David and Goliath in Inflation Forecasting: Competing with Institutional Forecasts using a Machine Learning Slingshot
This paper introduces a machine learning model as a univariate benchmark for real-time U.S. inflation forecasting. The model uses a Random Forest regression framework and derives all predictive inputs from engineered features. Using signal processing techniques, I extract the features from past inflation dynamics. Evaluated over the volatile inflation period from 2020Q1 to 2024Q4, the model reduces average forecast errors by about 14% relative to the Survey of Professional Forecasters and performs competitively with standard univariate benchmarks, particularly at short- and medium-term horizons. In addition, the Random Forest provides economically meaningful measures of forecast uncertainty and demonstrates that the engineered features contribute substantially to predictive accuracy. The results support including univariate machine learning models in forecasting model suites, especially in periods of heightened inflation volatility.

Other Papers

Robust Design of Countercyclical Capital Buffer Rules (with Hun Jang, Margarita Rubio, and Fabio Verona) – Bank of Finland Research Discussion Paper
We study countercyclical capital buffer rules that are robust to model uncertainty. We evaluate these rules across 12 Dynamic Stochastic General Equilibrium models, which differ in banking-sector frictions and transmission channels. To ensure comparability, we apply consistent loss functions and policy rule specifications. Our results show that robust rules call for a moderate response to key credit indicators, such as the credit-to-GDP ratio or credit growth. For a one-percentage-point deviation from steady state, the capital buffer should increase by 10-20 basis points. This cautious approach balances restricting credit and curbing growth with preventing excessive credit expansion and financial instability.

Endogenous Transitions to a Low-Inflation Equilibrium: Estimation of a Nonlinear New Keynesian Model (with Maik Wolters)
We estimate a New Keynesian model that allows transitions between a *target equilibrium*, with inflation fluctuating around the central bank's target and interest rates typically positive, and a *low-inflation equilibrium*, where the effective lower bound binds and de-anchored expectations keep inflation persistently below target. The model is estimated using Bayesian methods, employing an ensemble MCMC sampler with a particle filter to handle nonlinearities. We find that

the United States remained in the target equilibrium after the global financial crisis, the euro area transitioned to the low-inflation equilibrium in 2015, with the subsequent inflation surge initiating a return to the target equilibrium in 2021, and Japan entered the low-inflation equilibrium in the early 2000s. According to several model selection criteria, the equilibrium-transition model outperforms an alternative specification, in which the ELB binds only occasionally and expectations remain anchored, for all three economies. The two models yield markedly different parameter estimates, dynamics, and policy implications, highlighting the importance of incorporating equilibrium transitions into monetary policy analysis.

Navigating Uncertainty in New Keynesian Models: Stochastic Volatility, Learning, and Optimal Policy Responses
To quantify the impact of uncertainty on economic dynamics and monetary policymaking in a partial information setting, this paper introduces stochastic volatility and learning into a baseline New Keynesian model. Shock volatilities are subject to uncertainty innovations, which agents gradually learn about. Stochastic volatility and learning amplify welfare losses and bias optimal policy prescriptions. Average Inflation Targeting (AIT) outperforms Inflation Targeting (IT) in mitigating uncertainty and partial information effects. These results underscore the importance of incorporating information frictions in designing effective monetary policies under uncertainty.

Improving Inflation Forecasting During Periods of Low Inflation (with Alicia Pita-Marcet, Christian Schröder, and Maik Wolters)
Both standard macroeconomic models and professional forecasters systematically overpredict inflation during periods of persistently low inflation. We show that using a model in which inflation expectations can de-anchor from the inflation target, allowing a transition to a zero interest rate and low-inflation equilibrium, would have improved forecasting accuracy in Japan since the late 1990s and the low inflation episode in the euro area between 2013 and 2020. At other times and for the US economy, the model's forecasts remain similar in accuracy to a counterfactual model with anchored inflation expectations and to central bank inflation forecasts.

Conference and Seminar Presentations

2025 Dynare Conference, 23rd EEFS Conference, IWH-CIREQ-GW-BOKERI Workshop
2024 4th Workshop on Financial Econometrics, 22nd EEFS Conference
2022 IWH-CIREQ-GW Workshop, Seminar at Bank of Finland, CEF Conference, Seminar at University of Gießen
2021 Seminar at University of Würzburg, EEA Congress, RGS Doctoral Conference, BGPE Workshop

Teaching Experience

Undergraduate	Computational Economics, Monetary Policy and Financial Markets, Seminar in Macroeconomics, Thesis Supervision
Graduate	Monetary Policy, International Money and Finance, Seminar in Macroeconomics, Thesis Supervision
PhD	Summer School: Introduction to Macroeconomic Modeling and Estimation with Dynare

Professional and Research Experience

since Apr 2023	**Research Assistant, Kiel University**
since Oct 2024	**Guest Researcher, Deutsche Bundesbank**
2022 – 2024	Research Assistant at Deutsche Bundesbank, Frankfurt
2022 & 2023	Research Visits at Bank of Finland, Helsinki
2021 – 2022	Visiting PhD Student at ifo Institute, Munich
2019 – 2023	Research and Teaching Assistant at Universities Würzburg and Jena
2017	Internship at HSBC, Düsseldorf
2017	Internship at Ramboll Management Consulting, Hamburg
2015	Internship at ifo Institute, Munich

Referee Service

Economic Modelling, Macroeconomic Dynamics

PhD Coursework

2021	Advanced Numerical Methods (Fernández-Villaverde, Nuno)
2020	Tools for Macroeconomists (den Haan)
2020	Advanced Macroeconomics (Bayer)
2019	Quantitative Macroeconomics (Mitman)
2019	Advanced Microeconomics (Neeman)
2019	Bayesian Time Series (Korobilis)
2019	Numerical Policy Methods (Debortoli)
2019	Dynare Summer School
2019	European Monetary Policy in Practice

Skills

Programming	Julia, MATLAB, Python, Git, Bash, Slurm
Computational Methods	Bayesian estimation, particle filters, ensemble MCMC, machine learning, high-performance computing
Languages	German (native), English (fluent), French (basic)

References

Prof. Dr. Maik Wolters
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