Research Statement

My research interests are in time series econometrics and macroeconomics; I develop econometric methods and apply them to empirically relevant questions while maintaining a tight link to macroeconomic theory. My research falls into three themes:

- estimation of macroeconomic (Dynamic Stochastic General Equilibrium; DSGE) models,
- parameter-instability in vector autoregressions (VARs),
- dynamic network effects.

In the following, I briefly situate my past and ongoing projects. For references on the wider context and related literature I mention, please consult the citations in my papers.

DSGE Estimation DSGE models are widely used to analyze macroeconomic policy. In contrast to reduced-form, empirical models (e.g. VARs or Factor Models), they exhibit a high degree of theoretical coherence, since dynamics are constrained by equilibrium conditions that are derived by explicitly modeling the behavior of households, firms, a central bank, a fiscal authority, etc. In contrast to theoretical models used to investigate a particular economic mechanism, DSGE models add reduced-form modeling shortcuts to obtain a satisfactory data fit.

Many studies *calibrate* their macro models, i.e. they choose values for some model parameters (selected by the researcher) to ensure that the model matches some statistics from the data (selected by the researcher) and proceed to analyze the model-implied behavior of other statistics, possibly under different scenarios (policy counterfactuals). The alternative is to *estimate* the macro model, i.e. to conduct statistical inference on parameter values so as to maximize the likelihood of observing the data (selected by the researcher) under the considered model – frequentist/classical estimation – or to update accordingly one's belief on the appropriate parameter values from a prior to a posterior distribution – Bayesian estimation. Relative to calibration, estimation reduces the ad-hoc nature of model validation and quantifies the degree of uncertainty surrounding any model-implied results. Yet, the estimation of many models is considered practically infeasible, as it is computationally very expensive to evaluate their likelihood function. This holds in particular for models that feature a realistic heterogeneity of households or firms and for non-linear models that are required, for example, to accommodate borrowing constraints, the effective lower bound on interest rates, irreversible investments, or time-varying macroeconomic uncertainty.

In Mlikota and Schorfheide (2024), we propose a method to substantially speed up the Bayesian estimation of DSGE models for which likelihood evaluation is slow. It requires the researcher to specify an approximate model whose posterior distribution is close to that of the model of interest and whose likelihood can be evaluated fast. For a non-linear VAR and two non-linear DSGE models, our method reduces the estimation runtime by 27% to 88% relative to a benchmark.

In Mlikota et al. (2026), we propose a method to estimate DSGE models without relying on likeli-

hood evaluations at all. We show that the posterior can be approximated by simulating statistics from the model under different parameter values and evaluating the distance of model-implied statistics to observed statistics.

Parameter-Instability in VARs VARs are arguably the most popular tool for empirical research in macroeconomics. They standardly assume that the modeled variables can take on any value in the real numbers. This assumption was challenged when, following the financial crisis of 2008/09, the policy rates of many central banks were lowered to the effective lower bound (ELB) of around zero and stayed there for a long time. While theoretical models can accommodate the ELB rather easily, it poses greater challenges for empirical models like VARs. In Aruoba et al. (2022), we build a VAR with censored variables and regime-switching coefficients, i.e. a VAR that can accommodate the ELB on interest rates and features changing dynamic relationships among variables at and away from the ELB, in line with theory. We characterize parameter identification and we apply the model to document that the inflation response to monetary stimulus is stronger at the ELB, whereas the response of GDP growth remains unchanged.

Many studies allow for time-varying VAR parameters using a wide range of methodologies. Among them, many associate parameter-instability in the VAR – an empirical model – with instability of the economic environment that agents operate in ("structural instabilities"). For example, a range of papers use time-varying parameter (TVP)-VARs to explore whether the Great Moderation – the sharp reduction in inflation- and GDP growth-volatility after 1980 – is due to a change in the conduct of monetary policy ("good policy") or due to smaller exogenous shocks hitting the economy ("good luck"). Yet, the relation between TVP-VARs and macroeconomic theory remains unclear. In Amir-Ahmadi et al. (2025), we analyze the origins and nature of macroeconomic parameter-instability in VARs. For a general class of macroeconomic models, we show that TVPs correspond to non-linear economic dynamics, calling into question the common interpretation that TVPs are due to "structural instabilities". In addition, we show that TVPs generally exhibit reduced-rank variation, a property that we then exploit to get improved forecasts relative to standard TVP-VAR models and to interpret the origins of instabilities. The latter point to macroeconomic uncertainty and finance, both of which are commonly emphasized as important sources of non-linearities in macroeconomics, which corroborates the empirical relevance of our first theoretical result.

Dynamic Network Effects In economics, we often encounter a cross-section of units linked by a network of bilateral ties, such as sectors connected through supply chains or individuals acquainted to each other. A large theoretical and empirical literature documents that networks amplify idiosyncratic shocks – when a sector is hit by a productivity shock, the response of aggregate output is stronger the more central that sector is in other sectors' supply chains – and generate comovement in cross-sectional variables – the more immediate the mutual supply chain relationship of two sectors, the more strongly correlated is their output. How network-induced comovements unfold over time, however, is less well understood.

In Mlikota (2026), I develop an econometric framework – the Network-VAR (NVAR) – that derives the dynamics of cross-sectional variables – e.g. output across sectors – from the lagged innovation (shock) transmission along bilateral links – e.g. supply chains – and that can accommodate general patterns of how higher-order network effects accumulate over time. I characterize its relationship to two well-established frameworks: the Spatial Autoregression – which assumes that network effects materialize instantaneously rather than over time – and the Dynamic Factor Model (DFM) – which models cross-sectional dynamics based on a few "factors" rather than the innovation transmission along many bilateral links. In two applications, I then illustrate the two distinct uses of the NVAR: given network data, it estimates dynamic network effects; without network data, it offers a dimensionality-reduction technique for forecasting high-dimensional processes. In the first application, I show that an NVAR for sectoral output can be structurally motivated by a Real Business Cycle economy where it takes time for firms to convert inputs into outputs. In turn, I estimate that the dynamic transmission of productivity shocks along supply chains accounts for 61% of persistence in aggregate output growth, leaving minor roles for autocorrelation in exogenous productivity processes, hence reducing "the measure of our ignorance". In a second application, I forecast macroeconomic aggregates across OECD countries – CPI inflation, GDP growth and industrial production growth – by estimating a network behind global business cycle dynamics. Relative to a DFM, this substantially improves forecasting performance for all series, especially at short horizons.

In Mehl et al. (2026), we evaluate recent theories on invoicing currency choice in international trade by assessing the drivers behind the marked increases in EUR- at the expense of USD-invoicing observed in the 2000s for some countries – a rare phenomenon given generally stable currency shares. We show that theory amounts to a dynamic network formation model, where exporters in each country choose the price, quantity and currency denomination of their exports to each other country based on the prices, quantities and currencies chosen by suppliers and competitors. Ultimately, it points to two fundamental drivers of currency choice – trade preferences and exchange rate volatilities – whose contributions we quantify.

References

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