Research Statement

Irina Panovska

I. Overview

I am a macroeconomist and a macro-econometrician with a research focus on nonlinear business cycle dynamics. My work addresses how nonlinearities affect the transmission of demand shocks to the macroeconomy and how we can use quantitative methods to disentangle permanent from cyclical movements in macroeconomic variables.

My research on the transmission of demand shocks studies the nonlinear effects of policy shocks, such as government spending, on output, and the driving factors behind jobless recoveries. The second stream of my research is methodological and focused on identifying and estimating the cyclical components of output that are used to define the state of the economy. Recessions and expansions are cyclical phenomena, and policy actions intended to mitigate the effects of downturns primarily target cyclical movements in macroeconomic aggregates. Correctly identifying cyclical and trend movements is therefore crucially important for designing policy.

II. First Research Stream: Business Cycles Nonlinearities

In my single-authored paper **"What Explains the Recent Jobless Recoveries"** (2017, *Macroeconomic Dynamics*), I show that the link between employment and demand shocks has broken down over time, and this breakdown can explain a large part of the uneven employment growth that followed the last three recessions. In a recent related project "**A Look at Jobless Recoveries in G7 Countries"** (Elroukh, Nikolsko-Rzhevskyy, and Panovska, 2020, *Journal of Macroeconomics*)[1], coauthored with my former PhD student Ahmed Elroukh, we show that jobless recoveries are not limited to the US, but they are a global phenomenon. In another study with my PhD student Licheng Zhang **"Jobless Recoveries and Time Variation in Labor Markets"** (2021, working paper in preparation for submission in Fall 2021), we explore the reasons for this breakdown in much more detail. We show that the link between technology shocks, demand shocks, and labor inputs has changed substantially over time, with employers switching to more flexible labor inputs in response to business cycle movements, changing the pattern of recoveries in labor markets.

In two related projects, coauthored with my former classmate Luiggi Donayre, we show that the link between wage growth and unemployment changes over the business cycle. In **"Nonlinearities in the U.S. Wage Phillips Curve"** (2016, *Journal of Macroeconomics*), we document and quantify the importance of a breakdown in the link between the unemployment rate and wage that occurs when the unemployment rate exceeds two critical threshold levels. In "**U.S. Wage Growth and Nonlinearities: The Roles of Unemployment and Inflation**" (2018, *Economic Modelling*), we show that there are significant nonlinearities in the dynamics of wage growth that are triggered not only by the level of unemployment, but also by interactions between inflation and unemployment, which explains the unusually slow growth in wages in the aftermath of the Great Recession. This stream of my research demonstrates that the link between macroeconomic variables varies significantly over the business cycle and over time.

[1] The convention in economics is to list co-authors alphabetically. Being noted as the corresponding author often serves as an indicator of lead author.

Another set of my papers focuses on the related question of nonlinear transmission of policy shocks to the economy. In **"State-Dependent Effects of Fiscal Policy",** coauthored with James Morley and Steven Fazzari (2015, *Studies in Nonlinear Dynamics and Econometrics*), we show that the impact of an increase in fiscal spending is statistically and economically different depending on the time when the increase was implemented. This paper received an Institute for New Economic Thinking grant (IN01100009) and an Australian Research Council grant (DP130102950). It currently has over 220 Google Scholar citations (excluding all self-citations and citations by coauthors and including citations in the *American Economic Review* and the *Journal of Political Economy*), placing it in the top 10% of macroeconomics and economics papers according to SSRN and in the top 5% according to RePEc.[2] This paper was part of my dissertation. In our related work, **"When is Discretionary Fiscal Policy Effective"**, also joint with James Morley and Steven Fazzari (forthcoming at *Studies in Nonlinear Dynamics and Econometrics*), we look at a broader policy question and study whether spending and tax changes have nonlinear effects, and whether the effects of austerity measures are different in magnitude from the effects of stimulus measures. This project was presented at the Australian Treasury in 2017 and the fiscal response to the COVID crisis in 2020 reflected a recently revised view at the Treasury of the effectiveness of policy that is more consistent with our findings. I was the corresponding author on both of these studies.

In **"State-Dependent Exchange Rate Pass-Through",** coauthored with Luiggi Donayre (*Journal of International Money and Finance,* 2016) we study the effects of nonlinear demand shocks on prices through the exchange rate pass-through channel. In particular, we study if the state of the business cycle matters for the transmission of exchange rate shocks, and we find that the pass-through from exchange rate changes to prices is significantly higher in expansions. This paper is linked to the nonlinear policy literature because the pass-through directly determines the degree of independence when designing monetary policy in open economies. Even though we use Mexico and Canada as case studies, the results have important implications for the design of monetary policy in open economies in general. This study was cited and used by the Central Banks of Canada, Colombia, Peru, Mexico, and the Bank for International Settlements (citations for all of my studies can be accessed through my Google Scholar Page).

III. Second Research Stream: Trend-Cycle Decomposition Methodology

My contributions to this strand of literature are both empirical and methodological. In **"Testing Stationarity with Unobserved Components Models",** joint with James Morley and Tara Sinclair (2017, *Macroeconomic Dynamics*) we develop an econometric test that can be used to test for the presence of stochastic trends when the long-term trend and the cyclical component are correlated. In our working paper **"Weak Identification, the Pile-Up Problem and Finite-Sample Inference"** joint with Charles Nelson and James Morley (2021, Working Paper in preparation for submission), we tackle the issue of weak identification, which is an econometric and empirical problem that arises quite frequently in models used to estimate economic trends and cycles. We propose a modified statistical test for parameters of economic models, and we show that our test works well in finite samples. In **"Is Business Cycle Asymmetry Intrinsic in Industrialized Economies" (**2020, *Macroeconomic Dynamics*) we use different trend-cycle

[2] The median number of citations at top economics journals is 200 for papers published in the late 1990s and below 50 for papers published in the early 2010's (Card and Della Vigna, 2013).

decomposition approaches and model averaging to show that nonlinear business cycle movements are intrinsic, not just in the US, but in industrialized economies in general.

IV. Interdisciplinary Projects

Long-term trend movements and short-term cyclical movements in employment, output, and demographic variables are also very important for designing public policy. Given my interest in the nonlinear transmission of policy actions and in the use of large data sets to improve macroeconomic inference, I have used the macro-econometric approach I developed in my other projects in several interdisciplinary policy projects. In Meyerhoefer, Panovska and Manski (*Health Affairs,* 2016), we used the empirical models from my previous work to obtain long-term projections of dental care use in the United States. Comparing journals across fields is always particularly challenging because citation standards and publication delays vary wildly across fields. However, it might be helpful to note that *Health Affairs* is the leading interdisciplinary journal for Health Policy, Health Care, and Policy (ranked as the number one journal in Health Policy, Health Services and Health Care Sciences and Services, impact factor 5.23, acceptance rate <10%). In a recent project **"Quantifying the Impact of Covid-19 on the US Stock Market: An Analysis from Multi Source Information"** coauthored with Asim Dey, Toufiqul Hoque and Kumer Das, we combine new developments from statistics, machine learning, and nonlinear economic methods to quantify the impact of the pandemic on economic variables. We show that incorporating information about local spreads explains nonlinear stock market behavior during the pandemic. Dr. Dey was a postdoctoral research associate in Statistics at UT Dallas, and he was partially supported by a New Faculty Research Symposium University Grant for Interdisciplinary Research on which I was a PI. This paper is in the Revise and Resubmit stage at a statistics journal *PhysicaA.* This journal is rated as A level journal on many journal ranking lists (including the widely used Academic Accelerator lists), with a CiteScore in the top 92nd percentile and a sharply decreasing acceptance rate (18% in 2020).

V. <u>A Look Ahead</u>

My current work lies at the intersection of my two research streams. In a recent paper **"Decomposing the Output Gap with Inflation Learning",** coauthored with my former classmate Srikanth Ramamurthy (2021, Revise and Resubmit at *Journal of Economic Dynamics and Control*), we augment the statistical models used to extract the cyclical component of output with a theoretical model. We show that incorporating theoretically based adaptive learning-based inflation expectations in a quasi-structural model improves inflation forecasts and inference about the cyclical component of output. In my project **"Business Cycle Asymmetry and Synchronization and Asymmetry in the Eurozone"** with Vladimir Arčabić and Josip Tica (2021, Working Paper in Preparation for Submission October 2021), we use a related approach to estimate output gaps for countries in the European Union to examine the extent and nature of business cycle synchronization with the EU. This paper received two Croatian Science Foundation grants (UIP-2017-05-6785 and IP 2019-04-4500). My longer-horizon research agenda includes studying business cycle nonlinearities using much more granular data on how firms in individual sectors firms have changed their labor management practices and how much of the change was abrupt (caused by a structural break), and how much was caused by a gradual shift in the nature of the business cycle and technology shocks.