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Research Statement

My research aims to extrapolate the macroeconomic effects of agents who do not exhibit mathematically founded rational expectations. My fascination with non-traditional agents began several years ago when I took a course on Behavioral Economics as an undergraduate student. To this day, the benchmark models of economics primarily rely on the rational expectations assumption, especially in the field of macroeconomics, despite economists such as Keynes and Pigou attributing business cycles to behavioral factors such as "animal spirits" dating back to the 1920s and 1930s. A common concern with behavioral approaches is the dictum that in the absence of rational expectations "anything goes" and it is unclear where the literature should converge. To this end, my papers use empirical techniques, primarily Bayesian MCMC methods, to fit behavioral features to macroeconomic time series data so as to empirically test the importance of various biases or heuristics. In the rest of this research statement, I first begin by providing an overview of my job market paper, followed by a discussion of some other relevant research projects that I was or am involved with, and then conclude by offering some potential directions for my future work.

Job Market Paper

In my job market paper entitled "Investor Heuristics and Biases: Quantitative Effects on the U.S. Business Cycle," I explore the macroeconomic effects of modeling investors with cognitive features that depart from rational expectations. I begin with a benchmark medium-scale monetary DSGE model that includes a financial sector but adjust the investors to exhibit three forms of biases/heuristics when predicting future returns: anchoring and adjustment, exogenous confidence, and endogenous confidence. To ensure that I empirically test the importance of such behavioral features, I fit these models, using Bayesian MCMC techniques, to U.S. macro time series from the post-Volcker era until the start of the COVID pandemic. In keeping with modern methods of estimating behavioral frictions that call for the inclusion of survey data to encapsulate agents' actual expectations of the future, I include a measure of investors' expectations of future stock market performance. Both anchoring and confidence significantly improve the model's data fit. The estimated posterior means show that 18% or 31% of investor expectations arise from behavioral factors when modeled as exhibiting anchoring or confidence respectively. Corroborating prior literature, impulse responses under-react to shocks so as to better fit the survey data. Exogenous over-confidence shocks have a dual-effect on the economy, with an initial boom followed by a prolonged bust, corroborating my prior work in this field.

Other Projects

I have worked on a variety of other research projects that broadly classsify as behavioral macroeconomics. In a precursor to my job market paper, I wrote the "Effects of Investor Confidence Shocks on Business Cycles" which expands a medium-scale DSGE model with a financial sector to include exogenous shocks to investor confidence. Such investors adjust their leverage ratios in the direction of their over/under-confidence leading to the amplification of business cycles. I estimate this model by fitting it to a variety of macroeconomic time series. I find that in response to an overconfidence shock, the economy exhibits a dual-effect impulse response: overconfidence initially provides a sharp boost to output but this effect quickly subsides and triggers a large and prolonged recession. This closely mirrors the mid-2000s U.S. economy with an initial period corresponding to high output and confidence from investors but which soon devolved into the Great Recession. Additionally, in the presence of confidence shocks, other sources of financial recessions such as capital quality shocks are muted. This paper is currently under peer review at *Macroeconomic Dynamics*.

My research is not exclusively limited to the interaction between behavioral features and financial sectors. With coauthor Yanyan Luo, we are exploring the relationship between cognitive discounting and fiscal multipliers. Prior evidence on the efficacy of government stimulus has been mixed, perhaps due to the literature's emphasis on modeling agents with rational expectations. In a seminal paper, Gabaix (2020) presents a model where myopic agents cognitively discount future consumption. While it does find that such agents can cause fiscal stimulus to be effective, the model used is simplistic and robust empirical support is not included. We add myopia to agents' expectations in a model that is more commonly used for fiscal policy analysis à la Galí et. al. (2007). First, we investigate what effects such agents have on the determinacy conditions of the model; our analysis uncovers a *determinacy trilemma*. Only 2 out of the following 3 desirable outcomes may hold for determinacy: (1) reasonable values for the share of hand-to-mouth consumers, (2) reasonable values for cognitive discounting, or (3) active monetary policy. Secondly, we add several other shocks and frictions to this model to test for the empirical importance of cognitive discounting under the presence of other features that have historically been necessary for macro analysis. Even under these conditions, myopia has a marked positive effect on the fiscal multiplier at various horizons although, interestingly, the direction of this effect *reverses* after exceeding a threshold value for the share of hand-to-mouth agents. Finally, we conduct a Bayesian MCMC estimation exercise by fitting this model to U.S. macro time series along with SPF survey data on expectations of government spending. The estimation shows agents as exhibiting a high cognitive discounting factor of 0.52.

Future Work

My near-term research agenda is to expand on the job market paper and other projects described above. In addition to anchoring and confidence, literature in psychology and behavioral economics suggests other heuristics may also be at play such as representativeness, availability, or myopia, among others. These may be explored in a similar manner to my job market paper and the resulting economic effects measured and investigated. Additionally, the effect of news shocks has been important in the field of policy analysis; I would like to extend this idea to the macro-finance literature and measure the effects of future financial regulation/deregulation on the economy today. Further, the research into the nexus between cognitive biases and effective government policy is still at a nascent stage. Aside from research that primarily relies on the construction of large DSGE models of the economy, I am also interested in other means of investigating the macro effects of behavior as detailed below.

In a project with Dr. Fabio Milani, we are attempting to test our base theories of macroeconomics using the Turkish natural monetary policy experiment. Turkey has suffered a prolonged economic crisis characterized by soaring inflation and a collapsing Turkish lira that is generally attributed to its massive current account deficit and contrarian view of monetary, coupled with geopolitical frictions. Faced with high inflation, Turkey chose to *reduce* its interest rates when standard macroeconomic models would recommend the opposite. Theory suggests that such a contrarian policy would lead to an outcome called indeterminacy where the economy may tilt towards multiple equilibria with sunspot fluctuations affecting agents' expectations. We are attempting to fit a benchmark small open economy model to Turkish macro time series, along with survey expectations of the future, using Bayesian MCMC methods, under both determinacy and indeterminacy to test whether our standard macro theories still hold true.

I am also intrigued by the puzzle in behavioral macroeconomics whereby aggregate forecasts of macro variables under-react to news whereas most individuals who comprise these aggregate surveys over-react (see Coibion and Gorodnichenko, 2015; Bordalo et. al., 2020). A possible means of reconciling this paradox may be the method by which individual forecasts are aggregated. Prior approaches, such as the papers listed above, simply take individuals' point forecasts and average across them to generate a group consensus. However, in joint work with coauthor Parush Arora, we attempt to apply a Bayesian Opinion Pool algorithm to take individuals' density forecasts and aggregate them using Bayesian MCMC techniques to assign weights to individual experts. If successful, this paper may adjust survey data aggregation both for expectations analysis as well as when included in estimated models.