

RESEARCH STATEMENT

Since long, expectations have played a central role in macroeconomics. However, most of work considers a limited theory of expectation formation, in which agents are perfectly and homogeneously aware of the state of nature and others' actions. I am interested in exploring richer theories of expectation formation that are consistent with the data.

Most of my work studies the effect of agent heterogeneity on the macroeconomy and can be framed in two areas: (i) How does household and firm information heterogeneity affect the economy, and (ii) How does household wealth heterogeneity affect the economy.

A vast literature has documented that US inflation persistence has fallen in recent decades. However, this empirical finding is difficult to explain in the standard New Keynesian (NK) framework. In my job market paper, *"Inflation Persistence, Noisy Information and the Phillips Curve"*, I document empirically that firms' forecasts used to react sluggishly to news before the mid 1980s. However there appears to be a break and there is no evidence of sluggishness in recent decades. Using survey data on inflation expectations from US Professional Forecasters and the Livingston Survey, I document average forecast underreaction prior to 1985, and no underreaction afterwards. To explain this pattern, I extend the NK framework to noisy and dispersed information, where firms receive an imperfect signal of the aggregate state. I show that in this framework inflation is more persistent in periods of greater forecast sluggishness. Noisy information generates underreaction to new information because individuals shrink their forecasts towards prior beliefs when the signals they observe are noisy. This endogenous anchoring in forecasts causes firms to set prices to their existing prior slowing the speed of price changes. My results show that this change in firm forecasting behavior explains around 80% of the fall in inflation persistence since the mid 1980s. Noisy information provides a better fit to the data than an increase in the persistence of inflation shocks, for which I find no evidence.

I also study the dynamics of the Phillips curve over time through the lens of my model. I find that the disconnection between inflation and the real side of the economy can be explained by the change in information frictions. Contrary to the literature which has emphasized a flattening in the NK Phillips Curve in recent data, I do not find evidence in the change in the NK Phillips Curve structural slope once I control for imperfect expectations.

In my other research agenda I am interested in understanding how does household wealth heterogeneity affect the transmission and of aggregate shocks in the economy. In *"Monetary Policy and Liquidity Constraints: Evidence from the Euro Area"* (AEJ: Macro, *forthcoming*) Mattias Almgren, John Kramer, Ricardo Lima (graduate students at IIES) and I provide empirical evidence for a mechanism, the amplification of shocks by financially constrained households, present in modern monetary models that include household wealth heterogeneity. We quantify the relationship between the response of output to monetary shocks and the share of liquidity constrained households. We do so in the context of the Euro Area, using a Local Projection Instrumental Variables estimation. We construct an instrument for changes in interest rates from changes in overnight indexed swap rates in a narrow time window around European Central Bank announcements. We find that monetary policy shocks have heterogeneous effects on output across countries. Using micro data on household balance sheets, we show that the elasticity of output to monetary policy shocks is larger in countries that have a larger fraction of households that are liquidity constrained.

Much of my research agenda has focused on the role of the Full Information Rational Expectations (FIRE) assumption in the benchmark NK model. In *"HANK Beyond FIRE"* I explore the role of information frictions in the amplification of shocks by financially constrained households. Consider an economy with financially constrained households and optimizers. A monetary shock affects consumption through a substitution effect (partial equilibrium). Households' consumption demand is affected, firms adapt to the new demand schedule and wages in turn change. This income effect through wages affects financially constrained agents, with unity marginal propensity to consume, and amplifies the effect of monetary policy (general equilibrium, GE). The GE channel relies heavily on the FIRE assumption: not only are agents perfectly aware that an aggregate shock has occurred, but are also certain of other agent's actions. In this paper I am interested in exploring whether this result is robust to a micro-consistent deviation from the FIRE assumption. I find that the amplification magnitude is dampened by noisy information through a lessened role of GE effects. I also find that the determinacy region (or Taylor Principle) is widened as a result of *"as if"* aggregate myopia, and show that there is no Forward Guidance Puzzle. Finally, I find that transitory *"animal spirits"* or belief shocks can produce large and persistent effects on output and inflation.

I also study how deviations from the FIRE assumption affect the estimation of structural parameters. In *"Reconciling Empirics and Theory: The Behavioral Hybrid New Keynesian Model"*, Atahan Afsar (Stockholm School of Economics), Richard Jaimes (Pontificia Universidad Javeriana), Edgar Silgado (Central Bank of Ireland) and we argue that structural estimates of the standard NK model are at odds with microeconomic estimates, in particular the household discount factor, the degree of external habits and the Calvo price friction. To reconcile these findings, we develop and estimate a behavioral NK model extended to household habits and firm price indexation. We find (i) Strong evidence for bounded rationality, with a cognitive discount factor estimate of 0.4 at quarterly frequency (agents discount the future by an additional 60% compared to the FIRE setting), and that (ii) Bounded rationality coupled with these two extensions helps us in harmonizing the NK theory with micro empirical studies.

Finally, Richard Jaimes, Edgar Silgado and I are working on a project studying the dynamics of the price and wage NK Phillips Curves over time. Following on my job market paper we extend the setting to allow for wage rigidity and unemployment. Using micro-data on expectations from the Michigan Survey of Consumers, Livingston Survey of Firms and Professional Forecasters, we study if the changes in these curves documented by the literature is consistent with changes in expectation formation. In future work I seek to explore alternative information frictions, such as the role of forward information, and embed them in a quantitative HANK setting.

In summary, in my research agenda I am interested in exploring how information and wealth heterogeneity, for which we have strong empirical evidence, affect the macroeconomy.