

Research Statement  
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My research in econometrics is motivated by my desire to develop new statistical tools that benefit others. My focus can be characterized using two points:

1. Heterogeneity exists in economic data relationships *and is meaningful*.
2. Certain models and estimators can uncover this heterogeneity.

There are different ways to explore this heterogeneity. For example, in my paper “Does the Government Spending Multiplier Depend on the Business Cycle?” with Sebastian Laumer, I used a regime-switching model to estimate fiscal spending multipliers and show that they do not vary between expansions and recessions when the model is correctly specified, but that they do vary when the model is misspecified.

Expectile regression—also called asymmetrically weighted least squares—is my primary research topic. This method places different weight on data above or below the regression line and makes it possible to characterize different regions of the sample in a powerful way. Expectile regression is comparable to quantile regression (QR), but has many desirable attributes—linearity, efficiency (under conditions), smoothness, an interpretation as an expected value, and simpler estimation of the estimator’s covariance matrix. I believe that expectile regression is the most underserved subject in econometrics and that it has the potential to replace ordinary least squares as the “standard” empirical methodology in the future. I am not alone—others have suggested the same idea (Schulze-Waltrup et al. 2015). Ordinary least squares is a special case of expectile regression, so the barrier to entry is extremely low for practitioners. The value of the new methodology is tremendous. The only major barrier to the adoption of these estimators is the lack of awareness.

My job market paper, *When Expectiles are BLUE*, gives two concrete examples of the usefulness of expectile regression. In one example, US Census data is used to compare the change in the population of Mexican nationals in different cities during the 1930’s. During that period of time, discrimination was extreme and these immigrants were being harassed and forcibly returned to Mexico. A standard OLS regression shows that repatriation activity was more intense in areas with a higher proportion of Mexican nationals in 1930. But my methodology shows that the bottom of the distribution experiences a negative effect—these least-discriminatory cities appear to be a sort of “safe haven”. In those areas, the Mexican populations were *increasing* during this episode. When we explore the heterogeneity in the data, the underlying economic story becomes twice as rich. In the second application in that paper, I show that the racial disparity among black and white mortgage applicants is sometimes twice as large as OLS suggests.

The other barrier to the adoption of expectile regression methodology is the lack of capital invested in its use. This gives me a first-mover advantage, as I can produce core results that others will build on for many years. That strategy is the foundation of my ongoing work. In my job market paper, I have shown that a modified version of the Gauss-Markov theorem applies to expectiles. I cannot imagine a more fundamental result! In my second major paper on expectiles, I characterize the family of quasi-likelihoods that can be used to estimate expectiles using likelihood. This lays a foundation for expectile

ARCH and GARCH models, and others. There is a bigger picture: I will continue to import traditional econometric concepts and methods to the expectile regression framework. This has a high value to our profession. But because I wish to reduce barriers to entry even further, I am also writing a textbook on the subject.

My research on expectiles is unique and innovative in the social sciences, but it is not unprecedented. Rather, there is an interdisciplinary community currently laying the groundwork for this subject and facilitating its growth. A group of statisticians in Germany, finance researchers in Italy, and notable others are currently leading the charge. I intend to represent the social sciences in that charge.

I have a clear outline for my future research plans. Many major economic methodologies can be adapted to the expectile regression framework, so a roadmap is already in place. I am studying likelihood-based expectile estimation. Others are studying Bayesian methods. Binary response models are at the top of my agenda. Expectile regression for longitudinal data is a subject still in its infancy, but worth exploring. Expectile IV and GMM models must be addressed as well.

I also have ongoing research relating to deeper underlying questions. For example, the mean, median, mode, expectiles, and other statistics can be obtained as minimizers of certain loss functions (in expectation). These loss functions are merely a parametric embodiment of the econometrician's preferences. I am currently conducting a study with Minchul Shin (Federal Reserve Bank of Philadelphia) to estimate parametric loss functions from repeated observations of professional forecasters' behavior. Our analysis shows that some forecasters usually give point forecasts closer to the mode of their density forecast than to any particular quantile or expectile, while others prefer specific quantiles or expectiles. Earlier this year, I conducted a randomized controlled trial with undergraduate students to see how they would summarize small data sets when they were not asked to generate any specific statistic. The data will prove to be enlightening. These two projects show that my theoretical research is producing interesting applied results.

### **Working Papers**

- When expectiles are BLUE
- Does the Government Spending Multiplier Depend on the Business Cycle? *With Sebastian Laumer*
- Estimating Forecasters' Loss Functions *With Minchul Shin*
- Modifying the Gaussian Kernel for Kernel Density Estimation with Censoring
- Quasi-Maximum Likelihood Estimation for Conditional Expectiles
- The Aigner et al. MLE is not the Expectile MLE.

Links can be found on my personal website.