Research Abstract by **Xilong Chen**

Thesis Title: **The Semi-parametric MIDAS Model and Some of Its Applications: the Impact of News on the Stock Volatility over Multiple Horizons**

It is difficult to define *news,* and many definitions are model-based since part of what is announced is anticipated. Therefore, news is typically defined as a residual within the context of some type of prediction model, and the prediction model locks in the sampling frequency that is the reference time scale for analyzing propagation mechanisms. We try to accomplish two goals: (1) characterize *news* as much as possible as a model-free observation, and (2) measure the impact of news over any arbitrary horizon of interest. We revisit the concept of news impact curves introduced by Engle and Ng (1993), in the current high frequency data environment of financial market time series. Instead of taking a single horizon fixed parametric specification, we recast many of the original ideas in a very flexible multi-horizon semi-parametric setting. Technically speaking we introduce semi-parametric MIxed DAta Sampling (henceforth MIDAS) regressions and study their asymptotic properties. The analysis relates to and extends recent work by Linton and Mammen (2005). In addition we also introduce various new parametric models. We find that moderately good (intra-daily) news reduces volatility (the next day), while both very good news (unusual high positive returns) and bad news (negative returns) increase volatility, with the latter having a more severe impact. The asymmetries we find have profound implications for current volatility prediction models that are based on in-sample asymptotic analysis developed over recent years. In this context we discuss the link between diffusions and news impact curves.

So far, we are focusing on one-dimensional news and its impact. However, market participants typically record news from several sources simultaneously. For example, news about earnings of a particular firm is typically registered at the same time as news about general market conditions. We try to capture this notion of multi-dimensional news and its impact on future volatility, using the model-free definition of news and news impact curve. First, we extend the univariate semi-parametric MIDAS regression model to the multivariate case and study its asymptotic properties. Then, we apply this multivariate semi-parametric model to study how future volatility of an individual stock is affected by two sources of news: market-wide news and firm-specific news. The flexibility of the semi-parametric form helps to avoid the possibility of misspecification. To complement this, however, we also consider various bivariate parametric models. Applying the bivariate models, and some univariate models as comparison, using the 30-minute returns of eight individual stocks and the S&P 500 index, we find that in the case of multi-dimensional news, there still exists the asymmetric effect of news. The models based on multi-dimensional news, especially the semi-parametric model, show better in-sample fit and out-of-sample forecast performance than the models based on one-dimensional news. The multivariate semi-parametric MIDAS regressions also have wider applications.