Let me start.

Hi I am Jae Hyun Lee. I choose forecasting market price of apartment in Korea as a topic. In Korea, Housing price has been recognized as important economic factor for individuals and policy making. Also It is my recent interest because I want to buy one in the near future. As we can see, there is increasing trend in housing price, so it gave me motivation to predict exactly when to buy and what apartment is appropriate to buy. So I decide to make statistical approach on this problem.

What I focus is changing relationship between housing price and factors which decide the price of apartment. As we can see, in these graphs, regression coefficients are time varying and this changes are very natural. For instance, as the family size in Korea becomes small, the smaller house is preferred compared to large one than past. So using DLM, I wanted to reflect these changes to predict the price of apartment in future time point.

In this analysis, I used housing price data in gangnam district from 2006 to 2018 and use size, age, and floor as predictor variables

Model structures are as follow:

I assume that regression coefficient, beta is latent state in DLM. What I want to try is, fit VAR(p) model on regression coefficient and use this VAR coefficient as evolution matrix as G. G is calculated based on regression coefficients from each time point. And theta and F are used to make VAR(p) model have first order markovian structure.

I describe this model in graphic. When the vector of coefficient evolve, combining with predictor matrix, model predicts the price of individual apartment of future time point. In this model, predictor matrix is static because apartment itself doesn't change, the only thing I assumed to change by time is relationship

I will assess my model by comparing three candidate model. The first one is static theta which is ordinary linear regression model. Second one is random walk theta which changes according to time but does not have autoregressive structure between states. The last one is var(1) model which reflects change in data with AR structure between coefficients.

The assessment will be executed based on three criterions. To check model quality I will use AIC, and to check prediction performance, I will check MSE and coverage for next 15 months price using test dataset.

I want to improve this model in future, by Dynamic latent factor model, includes Macroeconomic factors such as GDP or stock market index. In addition, I want to apply hierachical structure in this model for every district so that models can share information which might make further improvement in model.