Financial Econometrics Rauli Susmel
FINA 4397

Practice Questions for Midterm 2

2.1 (**Heteroscedasticiy and Autocorrelation**) For this question, use the FX_USA_MX data set from my homepage (FX_USA_MX.csv). You can download into R using the following line:

FMX_da <- read.csv("http://www.bauer.uh.edu/rsusmel/4397/FX_USA_MX.csv", head=TRUE, sep=",")
You have quarterly data for prices for the U.S. and Mexico (US_CPI and MX_CPI, respectitvely), interest rates for the U.S. and Mexico (US_int and MX_int, respectitvely), and GDP for Mexico (MX_GDP). You also have the quarterly exchange rate (MXN_USD). For this question, you need to compute inflation rates and income growth rates (log changes) for Mexico and the log change in the exchange rate.

You fit the following regression model for Mexican interest rates:

$$i_{MX,t} = \beta_0 + \beta_1\, i_{US,t} + \beta_2\, e_{f,t} + \beta_3\, I_{MX,t} + \beta_4\, y_{MX,t} + \varepsilon_i$$

where $i_{MX,t}$ is the quarterly Mexican interest rate, $i_{US,t}$ is the quarterly US interest rate, is $e_{f,t}$ s the quarterly log change in the exchange rate, $I_{MX,t}$ is the quarterly inflation rate and $y_{MX,t}$ is the quarterly income growth rate.
a. Report the regression.
b. Report and interpret R^2 and β_1.
c. What are the drivers of $i_{MX,t}$.
d. Test for heteroscedasticity using the GQ test
e. Test for heteroscedasticity using the studentized LM-BP. You believe that $i_{US,t}$ and the squared of $I_{MX,t}$ and the squared of $e_{f,t}$ drive the variance of $i_{MX,t}$.
f. If you find heteroscedasticity correct the SE using the appropriate HC SE, report the adjusted t-values. Does any coefficient loses significance?
g. DW test for autocorrelation.
h. Test for autocorrelation using the BG LM test, with 4 lags.
i If you find autocorrelation, use the appropriate HAC SE and report the adjusted t-values. Does any coefficient loses significance?

2.2 (**Forecasting**) Continuation:
a. Estimate the model with data from **1978.2** to **2020.4**. You get **b** [b_0, b_1, b_2, b_3, b_4]. Report **b**.

b. Then, assuming that all your explanatory variables follow a Random Walk –i.e., the best predictor of next quarter's value is today's value-, forecast Mexican interest rates for the period **2021.1** to **2023.2**. That is, you forecast with the following model, where b_0, b_1, b_2, b_3, b_4 are OLS **b** coefficient from 2.2.a:

$$i_{MX,t} = b_0 + b_1\, i_{US,t-1} + b_2\, e_{f,t-1} + b_3\, I_{MX,t-1} + b_4\, y_{MX,t-1}$$

Report the MSE.

c. Using the same Random Walk assumption for the driving variables, forecast Mexican interest rates for **2023.3** (out-of-sample (OOS) forecast). For this purpose, re-estimate the model using the whole sample (**1978.2** to **2023.2**) and use to do the OOS forecast.

2.3 (**Modeling Strategies**). Download the data Real_Estate_2020.csv from my homepage.
RE_da <- read.csv("http://www.bauer.uh.edu/rsusmel/4397/Real_Estate_2020.csv", head=TRUE, sep=",")

The file contains log changes in home prices for Los Angeles (LA), San Francisco (SF), and Las Vegas (LV), the notation for prices changes is XX_c, where XX is the city. The file also contains changes in unemployment for each city (notation: ZZ_u, where ZZ is the city), an index of economic conditions for each city (WW_EC, where WW is the city), changes in the leading economic indicators for different states: California, and Nevada (notation, Xind_c, where X is the first initial of the state), changes in the Federal Reserve Tech Indicator and the Fama-French 5 factors: Mkt_RF, SMB, HML, RMW and CMA. You have data from Feb 1990 to Sep 2019. You want to model the log changes in home prices for Las Vegas (LV). Real Estate agents say that there is more activity in the summer, thus, you consider dummy variables for Spring, Summer, and Fall. Since Las Vegas was seriously affected by the 2008 Financial Crisis you add a dummy variable for the financial crisis.

a. Starting from a General Unrestricted Model, using all the variables you can think of that make sense to include, select an appropriate model for Las Vegas (LV).
b. What are the driver of LAS home prices in your reduced (specific) model, at the usual 5% level?
c. Did the 2008 Financial Crisis affect LAS prices? Do you have evidence of seasonality –i.e., are the dummy variables for Spring, Summer or Fall significant?
d. Check if the errors are normal (use a Jarque-Bera test).
e. Use NW SE to conduct tests of significance for the coefficients for the driver variables in the reduced model.

2.4 (**Non-nested Tests**) Download the Stocks_FX_1973 dataset (Stocks_FX_1973.csv).
a. Estimate two Fama-French 3-factor model for DIS returns: One with Mkt_RF, SMB and HML (Model 1) and the other with Mkt_RF, CMA and RMW.
b. Use a J-test to select a model.
c. Perform an encompassing test to select or favor a model.

2.5 (Theory Review) – True or False
a. If the data is heteroscedastic, we cannot use OLS.
b. White Standard Errors can be used when the errors show autocorrelation and heteroscedasticity.
c. OLS is still unbiased if we use the wrong variance structure –i.e., wrong (**A3'**) assumption.
d. The J-test always select a model.
e. The Chow test for structural change is independent on a given date.