Financial Econometrics Rauli Susmel
FINA 4397

Practice Questions for Midterm 1

1.1 (**Basic Data Analysis**). Download the quaterly FX_USA_MX dataset (FX_USA_MX.csv) from my homepage or use the following link:
FMX_da <- read.csv("http://www.bauer.uh.edu/rsusmel/4397/FX_USA_MX.csv", head=TRUE, sep=",")

You have prices (US_CPI and MX_CPI), money supply (US_M1 and MX_M1), interest rates (US_int and MX_int), GDP (US_GDP and MX_GDP), Current Account Balance (US_CA and MX_CA), and exchange rates in MXN per USD (S_t, MXN_USD), since 1978:I to 2021: IV.

a. Compute *g_us*, the log change in US GDP –i.e., GDP growth rate. Do a histogram for *g_us*.
b. Report the mean, standard deviation, skewness (γ_1) and kurtosis (γ_2).
c. Using an appropriate test, test if *g_us* is normally distributed (write down H_0 and H_1, compute test and your decision).
d. Using an appropriate test, test if the (quarterly) mean of *g_us* is zero (write down H_0 and H_1, calculate test and your decision).
e. Using an appropriate method, estimate a 95% C.I for the SD *g_us*.
f. Test if the annual rate of growth of the U.S. economy is 3%.

1.2 (**Bootstrapping and Data Analysis**). Using the FX_USA_MX data set, bootstrap the correlation coefficient ($\rho_{x=MX\_int,y=MX\_I}$) between Mexican interest rates (MX_int) and Mexican Inflation rates (MX_I).
a. Report the mean and the bias in your estimation..
b. Do the results change if you use B=100 and B=1,000.
c. Build a 95% C.I. for (ρ). Using the percentile method (using the previous C.I.) Test H_0: $\rho=1$ vs H_1: $\rho\neq1$.
d. The sampling distribution of r_{xy}, the sample estimator of ρ_{xy}, is only symmetric when $\rho=0$. Under this assumption and a bivariate normality for *x* and *y,* the SD(*r*) is equal to:

$$SD(r) = \sqrt{\frac{1-r^2}{N-2}}$$

where *N* is the sample size. Test if the correlation between Mexican interest rates and U.S. interest rates is equal to zero. That is, test H_0: $\rho=0$ vs H_1: $\rho\neq0$.
e. The difference between the realized interest rates and inflation rates is the ex-post real interest rate. Using a standard t-test, test if the ex-post real interest rate is zero in Mexico.

1.3 (**Regression and Testing in the CLM**). For this question, use the FX_USA_MX data set. You model Mexican interest rates (MX_int) as a linear function of US_int, MX_I, and Mexican log changes in GDP (MX_y), and Mexican percentage changes (not log changes!) in CA (MX_CA_c):

$$MX\_int_i = \beta_0 + \beta_1\, US\_int_i + \beta_2\, e_i + \beta_3\, MX\_y_i + \beta_4\, MX\_CA\_c_i + \varepsilon_i$$

a. Report the regression,

b. Interpret β_1 and interpret its t-values.
c. What are the drivers of Mexican interest rates in the regression? Which coefficient/coefficients look unusual?
d. Interpret the R^2 and report the F-goodness of fit test.
e. Using a Wald test, test if US inflation is missing from your regression.
f. Test H_0: $\beta_2 = \beta_4 = 0$ vs H_1: at least one β_2 , β_4, is different from 0.
g. Test H_0: $\beta_1 = 1$ and $\beta_3 = 2$ vs H_1: $\beta_1 \neq 1$ and/or $\beta_3 \neq 2$.
h. Test if the US_int coefficient is equal to one. If so, what would be the implication?
i. Mexico went through a very serious economic crisis during the fourth quarter of 1994 (the "Tequila crisis." Test with a Chow test if the Tequila crisis caused a structural break in your model.
j. Using the sample means, compute the expected Mexican interest rate, according to the model, in the sample. Did the model do a good job predicting the expected mean of the Mexican interest rate?

1. 4 (**Non-nested Tests**) For this question, use the FX_USA_MX data set.
a. Fit two models for MX_int:

$$MX\_int_i = \beta_0 + \beta_1 US\_int_i + \beta_2 e_i + \beta_3 MX\_I + \beta_4 MX\_y_i + \varepsilon_i \qquad \text{Model 1}$$

$$MX\_int_i = \beta_0 + \beta_1 MX\_int_{i-1} + \beta_2 US\_I + \varepsilon_i \qquad \text{Model 2}$$

b. Use a J-test to select a model
c. Perform an encompassing test to select or favor a model

1.5 True of False (Provide a very brief statement justifying your answer. No justification, no points.)
a. A Restricted model can have a lower RSS than an unrestricted model.
b. Joint Hypothesis and individual hypothesis do not have to reach same conclusions.
c. Type I error can be greater than Type II error.
d. Perfect multicollinearity is not a problem for the unbiasedness of the OLS regression.
e. The sampling distribution of the mean drives the sampling distribution of the t-tests and Wald-tests in small (finite) samples.
f. The J-test can be used to test restrictions of the model.
g. If the model is misspecified, OLS is not longer unbiased and consistent.
h. The Chow test can be used when three or more regimes are suspected in the data.
i. If returns are not normally distributed, it is not possible to test the CAPM.