



MODULE ASSESSMENT: Coursework

COLLEGE: Lincoln International Business School

SCHOOL: Lincoln International Business School

MODULE: Quantitative Methods for Economics and Finance II

MODULE CODE: FIN9028M

LEVEL: Post Graduate (Level 9)

CO-ORDINATOR: Dr. Jun Hou

DATE: 28/05/2021, 12:00 noon

TIME ALLOWED: N/A

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INSTRUCTIONS TO STUDENTS:

QUESTIONS TO ANSWER: Answer All questions

MARKING SCHEME: Questions in Section A are worth 40 marks
Questions in Section B are worth 40 marks
Questions in Section C are worth 20 marks

MATERIALS PROVIDED: Chow and Wang (2010); Chow and Lawler (2003); and Download from DataStream or, if DataStream is not available to you, Federal Reserve Bank of St. Louis (FRED)
(<http://research.stlouisfed.org/fred2/categories>)

NOTES TO STUDENTS: The required word count is 3,000 words in total excluding tables, graphs, and appendices. Use 'Cover Sheet Template for Assignment' on the Blackboard to prepare a cover page for your report

The coursework for this module consists of an individual project. The required word count is 3,000 words in total excluding tables, graphs, and appendices. Use 'Cover Sheet Template for Assignment' on the Blackboard to prepare a cover page for your report.

Note that this is not an essay type assignment. Please simply answer all the following questions one by one. Modify the STATA example programs on the Blackboard as you see fit to answer the following questions. Save your dataset and STATA programs in a .zip file with the name "FIN9028M_Student Name_Student ID" and send it to jhou@lincoln.ac.uk by noon Friday, 28/05/2021. Name your STATA programs (in a single do file) as "Q1", "Q1", etc., so that it is straight forward to match the program with your answer.

Please also note that this is an individual empirical project. You should work independently. Collaboration is considered dishonest and unprofessional. Please see module handbook on 'Dishonesty and Plagiarism' and related University Regulations.

A. Assignment Questions:

Question 1 (40 marks): Interpret and Replicate an Academic Paper

Read teaching materials and the paper by Chow and Wang (2010) "The Empirics of Inflation in China" to answer the following questions. Chow and Wang (2010) paper could be downloaded from the Blackboard.

- 1) On the first page, paragraph 3, the authors report "The Augmented Dickey–Fuller tests strongly suggest the presence of a unit root in $\log(P)$ and $\log(M2/Y)$." Verify this statement using the data provided in the paper. Report in detail the steps of your exercise with explanation. **(10 marks)**
- 2) On the first page, the last paragraph, the authors report "Let $u_t = \log(P_t) - \log(P_t^*)$ be the estimated trend deviation of the log price level or the error correction term. We then regress $d\log(P_t)$ on $d\log(M2_t/Y_t)$, $d\log(P_{t-1})$, and u_{t-1} where $d\log(X_t)$ is defined as $\log(X_t) - \log(X_{t-1})$, ...". What is "estimated trend" referred to in the first sentence and for what purpose it should be estimated? Replicate the last two regression results reported at the end of this page. Illustrate your understanding of this model. Specifically, what is the purpose for this regression? How to interpret the estimated coefficients for this model? Illustrate your understanding that the coefficient on u_t is negative. **(10 marks)**
- 3) Replicate both Figure 1 and Figure 2. (Hint: To obtain exactly the same graphs, the following options of Stata graph commands are required: ylabel, xlabel, yscale, xscale, xmtick, and yaxis. Key in 'help graph' in Stata command section to find out more). Provide your comments and interpretation on these graphs. Specifically, what can we learn from these two graphs? **(10 marks)**
- 4) On the second page, the second paragraph, the authors report "The following (table) reports the result of the Chow test for parameter stability using $t = 1979$ as the break point. The result provides extremely strong support for parameter stability of this equation."

Replicate the authors' F -test result in the described table and verify the authors' statement here. Why do we need to perform a structure break test in this case? What could be problematic if in this case we do have a structure break in the time series? Illustrate your understanding of the degrees of freedom of F -statistic reported in the table. Is there any limitation for this "Chow test for parameter stability" approach? **(10 marks)**

Question 2 (40%): Extend an Existing Study

Read teaching materials and the paper by Chow and Lawler (2003) "A Time Series Analysis of the Shanghai and New York Stock Price Indices" to answer the following questions. Chow and Lawler (2003) paper could be downloaded from the Blackboard. Stata data file 'cl_2003.dta' on the Blackboard contains data to be used for this question.¹ A detailed description for this data set is given in PDF file 'cl_2003_data description.pdf', which is also available from the Blackboard.

- 1) Verify the summary statistics reported in Table 1 – 4 of Chow and Lawler (2003) paper to confirm that 'cl_2003.dta' made available by the authors is not far different from the one been used in the paper. **(10 marks)**
- 2) In the same paragraph, the authors state that "The above result is one indication that the Chinese capital market was not integrated with the world market, but the degree of integration may increase in the future as China has become a member of WTO." Collect data from DataStream to extend the sample period of the current dataset up to the last week of June 2018. Provide empirical evidence to test the conjecture made by the author in this statement. Note that China officially became a member of WTO on 11 December 2001. **(10 marks)**
- 3) Construct an ADL(3, 3) model to conduct pseudo out-of-sample forecasts of weekly rate of return of Shanghai stock market using historical returns of both Shanghai and New York markets, over 2017 Week 1 – 2018 Week 25, using regressions that begin in 2001 Week 1. Illustrate in detail your estimation steps and your comments on the results obtained. **(10 marks)**
- 4) Using data for rate of return of Shanghai stock market, estimate an AR(1) model with GARCH(1,1) errors. Plot the residuals from this AR(1) model along with $\pm\hat{\sigma}_t$ GARCH bands as in Figure 16.4 in Stock and Watson (2014). Do you observe any sharp increase or decrease in the variability? Provide your comments on the results obtained. **(10 marks)**

Question 3 (20%): From Theory to Empirical Study

Download from DataStream or, if DataStream is not available to you, Federal Reserve Bank of St. Louis (FRED) (<http://research.stlouisfed.org/fred2/categories>) the following quarterly

¹ Source: <http://www.princeton.edu/~gchow/>.

variables for a country from 1950:Q1 to 2021:Q2 (or as early as possible and up to 2021:Q2):²

Price Index:	Quarterly aggregate price level (CPI or GDP deflator).
T-Bill Rate:	Quarterly values of the rate on 3-month treasury bills (as a proxy for nominal interest).
Nominal Money Balance:	Quarterly demand for nominal money balances, M1, seasonally adjusted.
Real GDP:	Quarterly values of real GDP, seasonally adjusted, in billions of chained home currency.

Now let

$Y_t = \ln(\text{RealGDP}_t)$, i.e., real GDP in logarithm;
R_t denotes the 3-month treasury bill rate;
P_t denotes the price index;
M_t^d denotes the demand for nominal money balance (demand for M1);
$MD_t = \ln\left(\frac{M_t^d}{P_t}\right)$, i.e., demand for real money balance.

In Macroeconomics, the model for the demand for nominal money balances takes the following form: $M^d = P \cdot (Y, R)$, where (Y, R) , in an implicit functional form, denotes demand for liquidity which depends on real output and interest rate. Since the demand for nominal balances is proportional to the aggregate price level, we can divide both sides of the nominal money demand equation by P . This gives the liquidity demand function or the demand for real balances function:

$$MD = \frac{M^d}{P} = L(Y, R).$$

For the second equality, the left-hand-side of the equation is the demand for nominal balances divided by the aggregate price level or the demand for real balances (the real purchasing power of money). The right-hand side is the liquidity demand function. The demand for real balances is now decomposed into a transactions demand for money (captured by Y) and a portfolio demand for money (captured by R). Now assume that (Y, R) has a linear functional form, we can construct the following empirical model based on theory for the exercises in this question:

$$MD_t = \beta_0 + \beta_1 Y_t + \beta_2 R_t + u_t$$

where u_t is a random error term.

² You should sign up for the country you would like to choose by TBC. Each country can only be chosen by at most 1 student. Sign-up sheet for this question will be available on the Blackboard under 'Assessment' section from TBC. We will follow 'first-come, first-served' principle.

- 1) Estimate a VAR(4) (a VAR model with four lags) for ΔMD_t and ΔY_t . Does ΔY Granger-cause ΔMD ? Does ΔMD Granger-cause ΔY ? Repeat the same exercise to investigate the relationship between ΔMD and ΔR . Explain and comment on your results. **(5 marks)**
- 2) Should the VAR models estimated in 1) include more than four lags? Explain your answer with evidence. **(5 marks)**
- 3) Now estimate a three-variable VAR model for ΔMD , ΔY , and ΔR . Conduct impulse response analysis based on this VAR model and provide your comments on the results obtained. **(10 marks)**

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End of coursework questions.

Supporting Documents for this Coursework:

Guidance for the assignment

Format

Cover page:	Please specify the module name, module code, your name and student ID using the cover page temple on the Blackboard.
Word limit:	3,000 words in total excluding tables, graphs, and appendices.
Referencing:	Your work must be fully compliant with Harvard protocols. Your assessment should include appropriate references to a variety of necessary literature sources and a wide-ranging bibliography of academic aspects of economics.
Font / Size:	Arial 11 or Times New Roman 11.
Spacing / Sides:	1.0 / Single sided / single line spacing between two paragraphs.
Pagination required:	Yes
Margins:	At 2.50 to both left and right, and 'justified'.