
RA COMPUTER BASED TEST MONETARY MODELING UNIT (AIMM), MCM, IMF

HIGH LEVEL DESCRIPTION OF THE TEST

This test comprises two exercises:

- Exercise 1: Financial soundness indicators data table
- Exercise 2: A short essay on capital flow measures (CFM) and foreign exchange interventions (FXI)

You have **48h** to complete both exercises. Exercise 1 should be your priority (and will be ours when scoring). Time permitting please attempt Exercise 2, but we strongly recommend you do that *only* when you are satisfied with your reply to Exercise 1.

To keep the playing field level, the instructions below are all the information you will receive, i.e. we won't be able to answer any follow-up questions during the test. If you find parts of the exercises ambiguous, please clearly indicate why the requirement may have been interpreted in different ways and your preferred interpretation when solving it. Additionally, please provide a brief description of any technical issues encountered, particularly if these prevented you from completing a task (only if applicable, of course).

Good luck!

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By taking part in the exercise you attest the following:

*I certify that I will not allow anyone to see the test questions or my answers, and that my answers are the product of my own work solely (you are allowed to use materials such as manuals, books, web pages, video tutorials, dictionaries, etc. but you should **not** consult your answers with anyone else).*

In addition, you agree to securing the test materials before, during, and after the test and not sharing them with any other person or third party in any shape or form (including, but not restricted to, print, electronic, verbal). If selected for the position, the same level of computer proficiency demonstrated in the test will be expected in your job at the Fund.

Failure to comply with any of the above will result in disqualification from the selection process.

EXERCISE 1: FINANCIAL SOUNDNESS INDICATORS DATA TABLE

This exercise asks you to process macroeconomic series using *MATLAB* and to present the series in a formatted output table.

Please use simple, clear and well-documented code (with as little hardcoding as possible) that is user friendly and that could be modified easily by another person (e.g. to add additional series or additional countries).

1. Please import the following time series for banking sectors of 19 major advanced and emerging market economies (listed below) on a quarterly basis for the period 2000-19 using IMF and BIS databases:¹

Country list: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Korea, Russia, Saudi Arabia, South Africa, Turkey, United Kingdom, United States.

- a. Customer Deposits
- b. Non-interbank Loans
- c. Capital
- d. Total Assets
- e. Non-performing Loans
- f. Total Loans
- g. Total Gross Loans
- h. Total Liabilities
- i. Net Income
- j. Foreign Currency Denominated Loans
- k. Foreign Liabilities
- l. Other Depository Corporations Claims on Private Sector ("Private Credit")
- m. Total Credit to the Private Non-financial Sector series to GDP ratio ("Total Credit to GDP", from Bank for International Settlements); and
- n. Nominal GDP

The data are available from two IMF databases, mainly the Financial Soundness Indicators supplemented by International Financial Statistics, and from the Bank for International Settlements.² You can download data in excel and import to MATLAB, however, we ask that you do *not* use Excel for data *manipulation*. All the relevant steps should be recorded and executed in program code.

2. Please calculate the following output series. Clean and manipulate the data where necessary. Present ratios as percentages (i.e. 56% rather than 0.56). Please make sure ratios are clearly labeled. Use your judgement on how to deal with missing values:

¹ Please note that some countries may be missing certain series; we are aware of the dataset limitations, so please just do the best you can.

² The series from Financial Soundness Indicators (FSI) are for Deposit-Takers, while those from International Financial Statistics (IFS) are for Other Depository Corporations.

- a. Customer Deposits to Non-interbank Loans
 - b. Foreign Currency Denominated Loans to Total Loans
 - c. Foreign Currency Denominated Liabilities to Total Liabilities
 - d. Capital to Total Assets
 - e. Return on Assets
 - f. Return on Equity
 - g. Non-performing loans to Total Gross Loans
 - h. Private Credit to GDP year over year growth rate
 - i. Private Credit to GDP quarter over quarter growth rate
 - j. The percentage point difference in the Private Credit to GDP quarterly growth rate
 - k. The trend Total Credit to GDP ratio (see step 4)
 - l. The Total Credit to GDP trend error (or “gap”) (see step 4)
3. Please generate a table with summary statistics: mean, standard deviation, number of observations. Include also key metadata on series (frequency, currency (where applicable), scale, data source).
 4. Please write a function that fits a polynomial with a linear and quadratic term of the form $(c + bx + ax^2)$ to the credit to GDP ratio with a rolling 30-quarter window (i.e. at date t , use the preceding 30 quarters to calculate the trend). Calculate the fitted values and the errors for each individual country.
 5. Please plot actual and fitted values from step 4 on the same chart with a separate legend for each country. Please place those country plots on a 2x2 panel figure (i.e. there should be 5 figures in total) and save them.
 6. What is the error (credit gap) that was calculated, and why might it be important? (2-3 lines)
 7. Please present the indicators you calculated in step 2 as a formatted table with the rows as dates and the columns as variables, individually per country.
 8. Please export the summary tables (computed in Step 3) and indicator tables (from Step 7) to two separate Excel files and save them. Please make sure data for each country are saved in a different worksheet.
 9. In Excel please color the indicator table cells for each data point by quantile (you may use the conditional formatting functionality in Excel): the cells which have values in the worst (“riskiest” across all countries in the sample) 25th percentile for that variable for that quarter should be red, those in the 25th-75th percentile should be yellow, while the least risky 75th percentile should be green.³ Briefly describe how you proceeded.
 10. Please send the raw data (with a description of how these were obtained, if not clear from the program code), the program code and the Excel summary statistics and indicator tables. Please also include answers to the question in steps 6 and 9. Make sure all steps are reflected in the program code and that each step is clear, well documented and easy to understand and modify (if required).

³ Note: Some variables are riskier at higher values, others at lower values. To avoid manipulating data in Excel you may use auxiliary output from MATLAB to help you complete this task.

An economist in the Unit is looking to model capital flow measures (CFMs) and foreign exchange interventions (FXIs). (S)he has little knowledge of the relevant literature and so has asked you to prepare a short (1,000 words maximum) summary of the relevant literature. This summary would ideally comprise two parts:

- Broad overview: what CFMs and FXIs are, what they have been used for, and why their use is controversial;
- Relevant bibliography: a list of key empirical and theoretical references (up to three each) that the economist should consider reading to quickly “get up to speed” on the underlying issues, with a very brief (1-2 sentence) summary of each recommendation.

Assignment Project Exam Help

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