**Before you start,**

This study will mostly serve in establishing a common baseline to discuss the technical aspects of the job, not as a conclusive test of your quantitative abilities; so feel free to answer the questions in a way you find enjoyable.

If you’re familiar with the topic, it should take about half an hour to write a proper answer, and no more than a couple of hours in any case. Please don’t spend an entire evening on this.

Use any software/language/framework you like, and include your code when replying.

**Case Study: Linear Regression**

Banks base their deposit pricing on the prevailing interbank market rates, and often use either the Central Bank policy rates or short term swap rates since deposits are short term products. Relationship between these markets are not exact, but follow each other closely enough.

Using attached data, build a simple linear regression model to formulate deposit interest rates given the market rates. Show/Explain your results in a brief model document.



Linear regression, basically, has the form, where is the matrix of independent variables, is the vector of dependent variable, and is the vector of error terms.

A few things you might want to include in your answer:

1. **Before building the model, check the data by yourself, and check the descriptive statistics. Are we trying to build a sensible model? Do you need to do some conversion with the variables? Does it make real-world sense that banks base their deposit pricing on CBT/swap rates? If not, or if it wasn’t available, what else could be used? (For example, could we use inflation, or USDTRY rate, GDP growth, or a combination of these?)**
2. **Choose one or at most two variables to build the model and state your rationale. Why did you choose what you chose? (Also, why did we limit the number of variables, wouldn’t the model fit better when we increased the number of variables?)**
3. **Build the model, complete with necessary time series tests. Interpret the results. Some tests may fail, how do you handle them?**
4. **Using the model, estimate the future deposit rates under given monetary policy evolutions below. Interpret the results.**



1. **Model equation indicates that we expect the model coefficients and to be constant. Why is it important that they are constant? How do we test for this? What do we do if it fails?**
2. **What does mean? Why does it matter, and how does it link to the tests we perform?**
3. **You may have noticed that whatever relationship existed in time series in the data disappears in 2023 (and recovers somewhat in 2024), and model predictions are significantly off. How do you explain this?**