Resit Final Project Guidelines

Analysis of Corporate Debt Maturity in Australia and Hong Kong

Project (Report and Jupyter Notebook) Due Date: Thursday, 17 November, 2022, by 6:00 pm.

You need to submit: Report and Jupyter Notebook to me via email.

For the resit final project, you will conduct analysis of the debt maturity of companies from the following two countries: Australia and Hong Kong.

Relevant financial data is available in one excel file: debt_maturity_data_2022.xlsx. You will have to upload this file to your Jupyter notebook and then conduct your analysis using Pandas and other Python libraries. You will have to submit the Jupyter notebook you used to do the analysis for this project.

You will have to write up your analysis in a report of up to 2,000 words. Your report should also include tables and graphs from your analysis. These tables and graphs have to be produced using Python and you will have to submit all the relevant codes in a single Jupyter notebook.

The objectives of your analysis are as follows:

- Document and discuss the distribution and trends in debt maturity ratio (long-term debt/total debt) over time in each country (Australia and Hong Kong):
    - Use long-term debt to total debt (total debt = short-term debt + long-term debt) ratio as the measure of debt maturity.
    - Debt maturity ratio measures the percentage firm's debt that is long-term debt.
    - Debt maturity ratio is not a meaningful measure in the following case, so you need to deal with this case in the data pre-processing step:
      When a firm has no debt (zero debt), the debt maturity ratio is not a meaningful measure.
        - So exclude observations (rows) with zero or missing total debt from your sample.
    - Also, cap the debt maturity variable and the key firm characteristics (e.g., as firm size, profitability, growth opportunity etc.) at the top and bottom 1 percentile level (see the cash ratio example).
        - Please note that by construction, the debt maturity value cannot be greater than 1.
    - You will conduct the analysis for Australia and Hong Kong and you will discuss how the debt maturity ratios of the two countries compare with each other and if they show similar or different trends over time.

        - Is there any marked change in debt maturity ratio in 2020 and 2021 due to Covid?
    - You will document the distribution of debt maturity ratio in each country in 2001 and 2021 to see if the distribution has changed over time. You can use histograms, kernel density plots and percentile plots to show and compare the distributions.

- Separately analyse the determinants of debt maturity ratio in each country. So you will have two sets of results.
    - Initially, explore the relations between various firm characteristics (such as firm size, tangibility, profitability and growth opportunity) and debt maturity ratio using scatter plots.
    - You will then conduct correlation analysis to determine if there are significant correlations between these characteristics and debt maturity ratio.
    - Then use simple linear regressions to quantify the relation between debt maturity and these characteristics one at a time. Here you will use regressions with one independent variable (see lecture 7).
    - Finally you will use multiple linear regression analysis to consider the effects of all the different firm characteristics on debt maturity ratio.
    - You will compare and contrast the results you get from the above analysis for the two countries in your sample: Australia and Hong Kong.

- Finally, you should estimate a Machine Learning model and evaluate the predictive performance of this model separately for Australia and Hong Kong.
    - Use only 2021 data for this analysis.
    - The first model will try to predict the debt maturity ratio of a firm. You can use the Boston House Price example as a template for this analysis and do similar analysis on debt maturity ratio (instead of house price).
        - As X (or independent) variables, use the four firm characteristics we used in the group project: Firm size (Logsale), Profitability, Tangibility and Market to book ratio.
        - The y variable or dependent variable in your model would be the debt maturity ratio.
        - You should to the train-test split and evaluate the model's performance on the test dataset and interpret the results.

You should read the paper by Fan et al. (fan_et_al_JFQA_2012) for this assignment. This paper analyses debt maturity ratio, and it will help you understand the general research background and how to interpret the results.

You should also do additional research via google on the determinants of debt maturity ratio and use those sources as references in your report.

As independent variables (X variables or the feature matrix) in your analysis, you should use the same firm characteristics that we used in the leverage analysis in the group project (such as firm size (Log of TA_USD), Tangibility, Profitability and Market to book ratio).

You will summarise you main finding is a report of 2000 words. The report will:

1. Summarise the relevant literature (research papers) and research question.

2. Report and discuss descriptive data analysis and data visualisation.

3. Report and discuss correlation and regression analysis

4. Report and discuss Machine Learning (ML) analysis of debt maturity ratio using the linear regression model (LinearRegression: covered in lecture 11 in the Boston House Price example). Fit an ML model to predict debt maturity ratio and evaluate the performance of the model.

6. Draw inference and conclusion and relate the findings to existing research.

Marks Distribution:

Marks will be distributed as follows:

Report write-up with graphs and tables (2000 words):	30%

80% of the marks will be based on the Juypyter Notebook and the following sections of the notebook (you should comment the Notebook so it is easy to follow your work):

Data cleaning and pre-processing:	10%
Descriptive analysis and data visualisation:	20%
Correlation and regression analysis	20%
Machine learning analysis: Linear regression	20%