Lion's Den
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Welcome on Lion's Den ING Risk Modelling Challenge!

During introductory presentations you've learnt how important risk modelling and risk managing are for the proper operation of a bank. We described what IRRBB is and why this is so important for banks to approach IRRBB correctly in management and measurement framework. Banks need to be compliant with Regulatory requirements but the way of risk management influence their net interest income as well. It can be done through a well-thought-out strategy toward asset and liability management.

You've also learnt what prepayment risk is and how you can approach this problem in the daily bank activity. Now it is time for you to put your knowledge into practice!

Description of your task

Welcome to the Lion`s Republic! Due to regulatory requirements and market practices, our bank wants to address the risk of customer behavior and hedge itself against changes in net interest income in case of potential loan prepayments. We already use some simplified method (constant prepayment rate or no prepayments), but based on today's workshop we are aware that it could be not enough. This is the reason why we invited you and ask for your help! 😊

We are providing you with the database which consists of banking, financial and macroeconomic data. **Your task is to analyze the data and to build the prepayment model which will tell us what the expected cash flow profile is for all of our portfolios in the next year horizon**. But please remember that we ask more teams for help and you need to convince us that your model is the best one (ever 😉).
You can use any software and tools that suit you and that you like working with.
During the first day of competition you have time for building the model and preparing the output:

1. **Descriptive part in a Word/pdf document** – please present the whole process of analysis step by step, from general understanding of the data, through any transformations and assumptions made, modelling choices, and final results. We will score not only the final results but the whole process to get these results. Remember that the modelling process is especially important for us, as we want to reward creative people with open minds and the pro-modelling way of thinking. Thus, share with us all of your thoughts and ideas!

2. **In the Excel file "Use Case", please provide the modelled cash flows for the whole period of analysis** (from 31.01.2016 to 28.02.2021). The period up to 29.02.2020 is treated as 'in-sample' training data. The period from 31.03.2020

to 28.02.2021 is our 'out-of-sample' test data. In this Excel spreadsheet, you can check the evaluation of your model with respect to two measures:

a. **Adjusted RMSE**: comparison of the modelled cash flows provided by you with the realized prepayments. This measure is calculated for both mentioned above periods. Adjusted RMSE is provided for both training and test data.

b. **GAP analysis**: simplified approach of measuring impact on P&L due to mismatches in repricing profile of position. This measure is calculated only for test period (1Y ahead). Simply speaking, the model profile of cash flow which You will provide will be used to hedge future cash flows. In excel we are comparing them with realized cash flows for that period. For each tenor there will be GAP between actual prepayment and prepayment from Your model. Those GAPs need to be refinanced on the market. The bigger are the GAPs, the bigger will be the impact on P&L in scenarios when interest rates will move up or down. Even though effect on up and down scenarios are symmetrical (in one loss and in the other profit), please remember that we want to hedge the risk! So the lowest are the results of P&L impact in GAP analysis, the higher score you get.

In the 'Use Case.xlsx' file we are also providing the results of above-mentioned metrics for the cases where there is no model (we didn't hedge the risk at all) or there is a constant prepayment rate (based on the average of the historical prepayment rates). Those two cases can be treated as a benchmark for your model. You can use metrics provided in the "Use case" sheet to evaluate your model and compare different approaches. Please remember that you should not rely only on the metrics from Excel but think about your own methods of evaluation as well. You need to convince us that your model is the best.

3. This is not the end of your task. As you know from the preselection task, **the government of the Lion`s Republic decided to introduce some policies aimed at protecting natural environment of the country. We don't know the final regulations yet, but we have heard some rumors**... In order to promote "green mortgages" (energy-saving mortgages, environmentally friendly houses with low CO2 emissions) some special offer will be introduced, a new loan product with a preferential interest rate or with some grace period, funded by the government. **What do you think? Could it impact performance of your client's model?** If yes, please provide your explanation and suggestions for

improvement (expert overlay) of your model. **This explanation should also be included in the descriptive part of point 1**. We know that this is a difficult topic, but don't give up on that and try to be creative!

Based on the materials provided by all the teams, we will select the best 6 teams which will have the opportunity to present their results to our jury on the second day of Lion's Den.

Remember!

This task is about **modelling of client behavior risk**, so the **prepayments** that you will present together with the description of your modelling process is the **main goal** and the **main delivery** that we are expecting. However, remember that we also ask you to cover climate risk! Inclusion of climate risk **in the descriptive part** and in **your presentation during second day** of Lion's Den meeting (e.g. how potentially it could be included or how we can approach it in the future, what challenges you see for banks with relation to this topic) can raise your rating and bring you additional points and bring a competitive advantage!

A few hints:

- You don't have too much time (only 8 hours) and the description of how you develop your model is the most important. Maybe it is a good idea to write the documentation on the ongoing basis, and not leaving it for the last moment.

- Thera are many approaches and technics to handle prepayment modelling and you probably will not have time to test each of them. This is why we encourage you to explain briefly each method that you think of, even though some of them you will skip during the actual modelling process. Substantiate what alternatives you considered and what determined your final choice.

- Good data analysis is a key to success but please remember that there are also other steps to do. Be smart and divide your time and tasks within the team wisely.

- Please remember that if you have any questions or doubts you can always ask mentors!