**Prompt:**

1. What were the total predicted losses for the mortgage (mtg) portfolio in 2016 calendar year?

2. What are some factors that can cause the predicted loss rates to change?

Assuming the predicted loss rates are related to each portfolio or loans (mtg, auto or cc) for each period, the total expected credit loss can be derived from the product of Probability of Default (PD), Loss Given Default (LGD) and Exposure at Default (EAD) (ECL = EAD \* PD\*LGD). Given ECL is the ultimate weighted average of loss, we only focus on the drivers that cause the change in predicted loss rates in this case (PD & LGD).

**Probability of Default**

PD dedicates the likelihood the borrower loses the financial capability to main scheduled payments. Below are some factors that represent PD:

* *Credit Score*: major credit rating agencies estimate PD and rate with credit scores, which can be derived from economic conditions and other factors. In this given case, the Category field indicates the range of credit scores, so higher score can indicate a lower PD, thus a lower predicted loss rate
* *Macroeconomic factors*: economic growth, interest rate and unemployment rate are the most common economic factors that can cause PD to change. For example, a economic recession, higher interest rate and higher unemployment rate indicate borrowers will more likely face with economic pressure, so it can result in a higher PD for a higher predicted loss rate.
* *Loan to Value:* a higher LTV ratio requires borrowers to pay higher interests, thus a higher predicted loss rate. In some cases, a high LTV can be brought down by a mortgage insurance and thus justify the loss rate.
* *Total Debit/Gross Debit to Income Ratio:* total expenses or gross mortgage expenses against the total income of borrowers can indicate the financial capability of the borrowers to cover expenses. Higher TDS/GDS leads to higher PD thus higher predicted loss rates.

**Loss Given Default**

LGD is the adjustment for post-default recoveries, such as cash payments, realization of securities or sale of debit.

* *Size of loans* : when other factors remain equal, the higher total loan volumes represent a great risk, so a higher predicted loss rate.
* *Collaterals*: if loans are pledged by collaterals, the borrowers share the risk of LGD, thus a lower predicted loss rate.
* *Historical trends*: LGD is based on an analysis of historical post-default recoveries. The comparable historical predicted loss rate may change the predicted loss rates.

**Parameters:**

Duration: 2 Hours

Tools: Python, R, SQL, Excel

1. SQL:
   1. Load two tables
   2. SELECT ORIGINATE 2016
   3. SELECT RATES 2016 MTG
   4. JOIN TWO TABLES BY DATE & MTG
   5. Sumproduct the total predicted loss
2. Python
   1. Read csvs
   2. Dropnas in first table
   3. New colume to combine date & type into a unique id
   4. Join tables
   5. Calculated predicted loss and create the new columne
   6. Sum
   7. Extract new table

Lawrence:

Data, Value

Data drop NA.

Loop: Index

Value drop Period other than selected. Value1

Value 1 drop other than selected portfolio

Select result back to the H

2:

Merge AB = C

Merge AB = c