Case-study

Introduction
A home equity loan - also known as an equity loan, home equity instalment loan, or second mortgage - is a type of consumer debt. Home equity loans allow homeowners to borrow against the equity in their homes. The loan amount is based on the difference between the home's current market value and the homeowner's mortgage balance due. Such loans tend to be of a fixed rate.

Learning Outcomes
- Analyze HMEQ data using MS Excel to draw meaningful insights on loan defaults
- Use MS Excel efficiently whilst dealing with various business problems to facilitate effective decision making

Graded Assessment | Background Information & Scenario

Background Information
The Consumer Credit department of FinSec Bank wants to automate the decision-making process for the approval of home equity lines of credit. To do this, they will follow the recommendations of the Equal Credit Opportunity Act to create an empirically derived and statistically sound credit scoring model. The model will be based on data collected from recent applicants granted credit through the current process of loan underwriting. The model will be built from predictive modelling tools, but the created model must be sufficiently interpretable to provide a reason for any adverse actions (rejections).

Scenario
The Home Equity dataset (HMEQ) contains baseline and loan performance information for 5,960 recent home equity loans. The target (BAD) is a binary variable indicating whether an applicant eventually defaulted or was seriously delinquent. This adverse outcome occurred in 1,189 cases (20%). For each applicant, 12 input variables were recorded.

Graded Assessment | Problem Statement/Business Objectives

Analyze the Home Equity data captured by the bank and depict the strategies that can be implied to reduce loan defaults by the customers.

Graded Assessment | Data, Information for Case Analysis

Data is provided as an xlsx file, ABADS_W3_MSExcel Adv Grad Assessment Data. Below is the source and attribute information.
Source Link: https://www.kaggle.com/datasets/ajay1735/hmeq-data

Data Description
BAD: 1 = client defaulted on loan; 0 = loan repaid
LOAN: Amount of the loan requested:
MORTDUE: Amount due on existing mortgage:
VALUE: Value of current property
REASON: The purpose of a loan application. DebtCon = debt consolidation; HomeImp = home improvement
JOB: Six occupational categories
YOJ: Years at present job:
DEROG: Usually nine months for federal loans, your lender will declare the loan to be in default. The entire loan balance will become due at that time.
DELINQ: Number of delinquent credit lines.
CLAGE: Age of oldest trade line in months
NINQ: Number of recent credit lines
CLNO: Number of credit lines
DEBTINC: Debt-to-income ratio

Graded Assessment | Questions, Deliverables for Solution, and Rubric

Questions

1. What is the maximum amount of loan requested by a customer of the bank whose JOB falls under the "Office" category? (Use array formula).
2. How many customers have their respective debt-to-income ratio greater than the average DEBTINC?
3. Calculate the total amount of the top five mortgage dues using appropriate functions in Excel.
4. Determine the number of derogatory reports for the trade line with age 227.1299 months, using Match and Index functions.
5. What is the average value of a property for a self-employed client who has defaulted on the loan? (Use array formula).
6. Examine the relationship between the loan purpose and the number of delinquent credit lines. Note down the inferences drawn.
7. What can you deduct about the debt-to-income ratio in relation to a job?
8. Create a Pivot table detailing the number of delinquent credit lines for each job category in relation to the reason column. Then determine the number of delinquent credit lines for the "ProfExe" job category where the reason is given as "HomeImp".
9. Design a pivot chart highlighting the total mortgage due across different job categories in relation to the reason for the loan and show the results for loan defaulters. Note down the observations drawn.
10. Create a dashboard with two pivot charts:

- One showing the total number of credit lines taken across job categories for loan defaulters, using the "REASON" column as a slicer
- Another for debt-to-income ratio across job categories with years at a job as a slicer

Slice and dice the charts where debt consolidation is cited as the reason along with a decade of job experience. Also, draw meaningful insights from the dashboard.

Deliverables for Solution and Rubric

- Required deliverables – an Excel workbook with each sheet dedicated to the solution of each question; the inferences, if applicable, are to be included in the respective sheets
- Submission templates – N/A
- Student facing and faculty rubrics – Total of 20 points where:

- Questions 1 to 4 carry 1 point each – 4 points cumulative
- Questions 5 to 8 carry 2 points each – 8 points cumulative
- Question 9 carries 3 points
- Question 10 carries 5 points

Note: There's no one-correct-way for tackling this exercise, but the outputs must be appropriate.