



Image. Christina Morillo in Pexels, 2018.

Loan Approval Policies in Times of Economic Slowdown

2-SP28-06-200

This problem situation was written by José Hugo Ochoa Vázquez (hugoochoa@tec.mx), with the purpose of serving as discussion material in the classroom; it does not intend to illustrate good or bad administrative practices. The story on this document is based on different people's experiences; some data has been modified at the request of the people and institutions involved.

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Interest Rates after COVID-19

As the effects of the overcoming of the COVID-19 Pandemic start to fade off, some countries are experiencing an economic slowdown (The World Bank, 2022). One of the causes for this is that consumers have started to be more cautious: they are spending less (Christelis et al, 2020) and seek to save their money if the rates are attractive. To help ease these impacts, countries tend to lower interest rates, to discourage savings and increase spending, trying to effectively accelerate their economies.

The process to increase interest rates is not “magic”. To achieve this, central banks issue more money which is distributed to commercial banks. These institutions, in consequence, offer credits with lower rates to consumers, promoting consumption.

HOBNJ and their Credit Policy

“HOBNJ” is a financial group that is the result of the merger of a small regional bank and another institution. Both entities are located in the U.S.A and the merging process finished in 2023. The new board of owners is revisiting the algorithm that both entities use to approve a personal loan. HOBNJ issues loans to different profiles of clients; loans are of different amounts, depending on their particular financing needs. The clients’ profiles contain data from 12 different variables.

HOBNJ has an operation manual to define who is eligible for a loan; the variable “*Bank score*” should determine it. The operation manual states it as follows:

“Any client, whose profile algorithm results in a number higher than 30% of one standard deviation above from the mean of the scores of all the clients of the six months prior (to the date of the calculation) can be granted a loan. These conditions apply save for exceptions, which in that case the Board of Directors will decide if the decision is reverted.”



Image. Anna Nekrashevich in Pexels, 2021.

Clients' Profiles and their Variables

The former Boards of Directors of the merged entities delivered a database of the past 200 loan applications. That number is the average of applicants every six months.

The database delivered by the Boards of Directors, is in the Excel® file located [HERE](#):

In this file, 12 variables are mentioned, and datasamples for each variable from clients' profiles are included. The meaning of each variable and their abbreviations are mentioned below:

Payment history: maximum number of days that the client has been late on any credit payments in the past six years (PMT_HST).

Amount owed: total sum of debt that the client has been granted in the past six years in thousands of dollars (AMT_OWED).

Score: FICO¹ credit score; a number between “300” and “850” describing the past credit and paying behavior of the client (SCORE).

Number of dependents: number of people that depend economically on the client; this includes children under 21 years old, unemployed spouse, and elder parents (DEPENDENTS).

Age of the client (AGE).

Education: number of years of formal education of the client (EDUCATION).

Position: A number from “0” to “8” describes the level of the job the client has, where 8 is member of a board of directors, high-rank military, high-level public server, associate of a firm, or similar, and “0” is unemployed or freelance with less than 10 years with their independent business (JOB_POSITION).

Industry: An undisclosed ranking of different groups of industries with different financial strengths, going from “0” to “10” (INDUSTRY).

Income: Net annual income of the client's household in thousands of dollars (INCOME)

Home ownership: “1” for a client with his/her own home, “0” for clients who do not own their home (HOME_OWN).

Bank score: An internal score comprised of all the other elements that make a client's profile (BNK_SCORE).

Credit approval: “1” for client with an approved loan and “0” for a client whose credit was rejected (APPROVED).

Note: The column labeled with “SUBJECT” in the Excel® file is not a variable, but it is a numeration of all the clients asking for loans.

Jane and the Current Board of Directors

In 2023, the current Board of Directors (CBOD) in HOB NJ has some questions about the internal credit analysis. To answer these questions, they hired Jane.

¹ A FICO score is a credit score created by the Fair Isaac Corporation (FICO). FICO scores take into account data in five areas to determine a borrower's credit worthiness: payment history, the current level of indebtedness, types of credit used, length of credit history, and new credit accounts. Source: (Hayes, 2023).

The CBOD asked Jane to test the model to answer the following questions:

- 1.-Whether the current algorithm considers all the variables from the database.
- 2.-How big is each one of their effects in the calculation of the *Bank score*?
- 3.-Is the model statistically significant?
- 4.-Are the residuals of the model homoscedastic?
- 5.-Are the residuals normally distributed?
- 6.-(About questions number 4 and number 5): Do they comply with all the assumptions of the Ordinary Least Squares Model?
- 7.-(About questions number 4 and number 5): How could those coefficients be interpreted?

Previous to the test of the model and after a general review of the database, Jane found the following:

- As mentioned before: The column labeled with “SUBJECT” in the Excel® file is not a variable, but it is a numeration of all the clients asking for loans, so it must not be used.
- To interpret the variable labeled “APPROVED” there is a need for more time and information, which this study does not have, so it must not be used.

Based on Jane’s findings, the CBOD should adjust the model so that it becomes the best linear unbiased estimator,

In addition, CBOD asked Jane the following:

- 1.-With the adjusted model, Jane must perform a simulation for 200 new loan applications. CBOD must decide whether the current policy is good for this issuance of new credits, since they received \$500,000 USD that they must place in credits by the end of the next six months.
- 2.-Taking into account that the average credit amount issued is \$3,650 USD, Jane must generate three scenarios by altering the credit approval policies given that in a pessimistic scenario, the bank will only place 60% of the money, in the optimistic scenario, they will place 90% of the money and the most likely scenario is a value in between.

The final product from Jane to the CBOD must include a policy that would assure HOBJ, that they can use it when the rates tend to low down (for example: when there is a need for promoting consumption in the country).

References

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