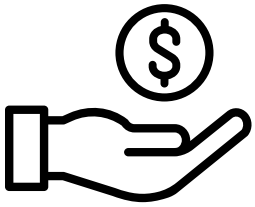

BUSINESS REPORT
MARKETING CAMPAIGN

This report analyzes the results of a telemarketing campaign aimed at promoting term deposits. The objective is to predict the likelihood that a customer will accept the commercial offer based on their socio-economic characteristics and the macroeconomic conditions at the time of the call.

Dataset Overview

The dataset contains 41,189 records, each representing a phone call made to promote the financial product. The acceptance of the offer is imbalanced in the data: approximately 11.3% accept, while 88.7% decline.

Qualitative variables

First, in the exploratory analysis of the dataset, the customers' socio-demographic variables were examined to identify, for each variable, the category with the highest percentage of customers accepting the term deposit.

The analysis highlighted that being **over 60 years old, having a low education level, being retired,** and **having a credit history without defaults** emerge as factors associated with **higher acceptance.** Regarding marital status, homeownership, and the presence of loans, no significant differences in offer acceptance were observed.

However, these characteristics were evaluated individually and do not necessarily imply their co-occurrence within the same individual.

Quantitative variable

To further explore the relationships between the quantitative variables in the dataset, a correlation matrix was generated: values close to 1 indicate a strong positive relationship, while values close to -1 indicate a strong negative relationship.

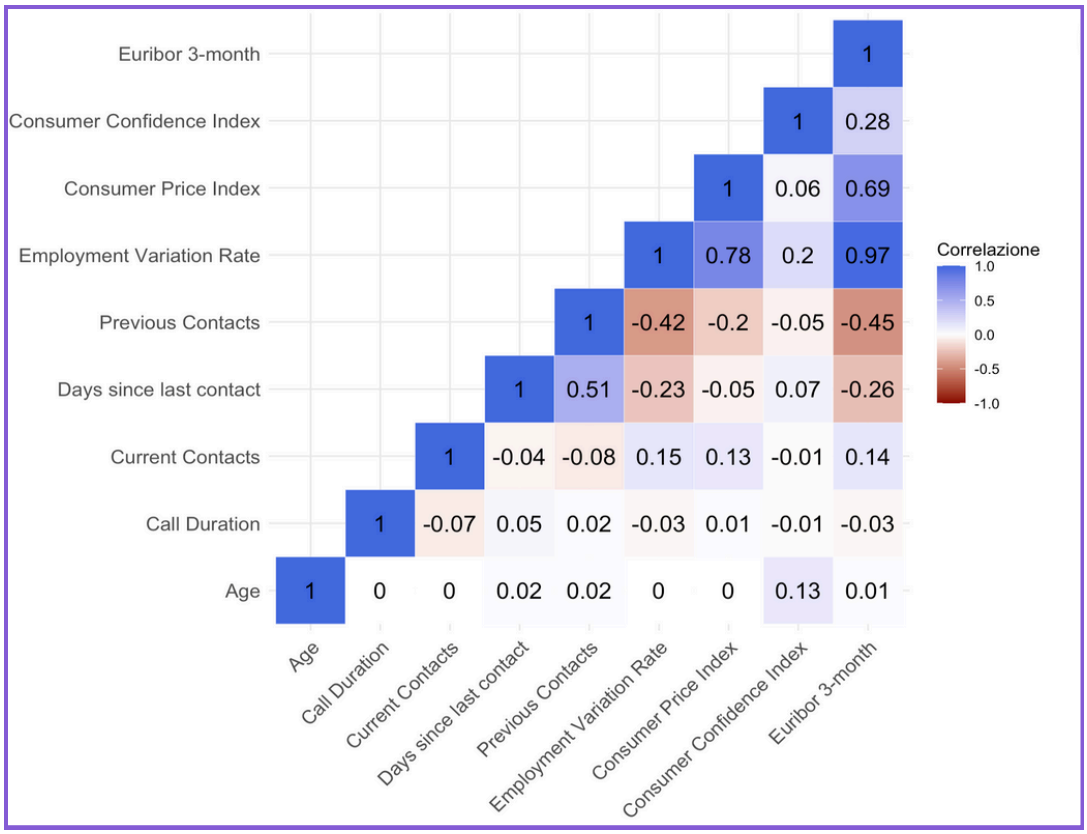

Figure 1 - Correlation Matrix

- **Euribor 3-month and Employment Variation Rate (0.97):** if employment increases, the economy generally tends to grow, and the ECB may raise interest rates to contain inflation. This could lead to an increase in the 3-month Euribor.
- **Employment Variation Rate and Consumer Price Index (0.78):** generally, an increase in the employment rate tends to be associated with higher demand for goods and services, which can drive prices up.
- **Consumer Price Index and Euribor 3-month (0.69):** rising prices may prompt the central bank to intervene by increasing interest rates to control inflation.
- **Previous contacts and Days since last contact (0.51):** if a customer has been contacted frequently in previous campaigns, it is likely that the last contact was not recent.

Binary classification model

Using logistic regression, a classification model was developed to estimate the probability of a customer accepting the commercial offer and to identify the key factors influencing this decision. As highlighted in the dataset overview, there is an imbalance between users who choose to subscribe to the term deposit and those who do not; therefore, a sample balancing technique was applied to improve the reliability of the predictions.

Among the features available for each record, four were excluded from the model because they exhibited high correlation with other variables and/or did not significantly influence the outcomes.

The final model leads to the following conclusions:

Variabile	Interpretazione
Age	As age increases, the likelihood of acceptance rises.
Marital Status	Divorced and married customers are less likely to accept the offer compared to single customers.
Previous Default	If the customer has no prior defaults, they are more likely to accept the offer.
House Ownership	Customers who own a home may be more inclined to accept the offer.
Call Duration	The longer the call duration, the more likely the customer is to accept the offer.
Days since last contact	If the customer has been contacted recently, the likelihood of acceptance decreases.
Previous contacts	If the customer has been contacted multiple times, they may be less likely to accept the offer.
Employment Variation Rat	A higher variation in the employment rate reduces the likelihood of acceptance.
Consumer Confidence Index	Consumer confidence has a positive effect on acceptance.
Consumer Price Index	A higher Consumer Price Index increases the likelihood of acceptance.
Job category	Unemployed individuals and employees in technical/administrative roles are more likely to accept the offer compared to managers/entrepreneurs or those in manual/operational jobs.

The **variables highlighted** in the table are those that have the greatest impact on the likelihood of acceptance.

Highlights

The logistic regression analysis highlights key factors influencing the likelihood of subscribing to the term deposit offer. To maximize the effectiveness of the next campaign, the company could adopt the following proposed strategies:

1. Targeted Segmentation

It is recommended to segment customers based on credit history, occupational sector, and recent interactions with banks, customizing the message accordingly. For example, the financial security of the term deposit could be emphasized for retirees and customers with a positive credit history. For technical/administrative workers and unemployed individuals, the product could be presented as an accessible and advantageous solution, while for managers and entrepreneurs, the focus could be on stability and the benefits of term deposits.

2. Optimal Timing for Contact

It is advisable to avoid contacting customers too frequently, especially if they have been recently involved in a campaign. Calls could be scheduled at the most appropriate times, using data on past interactions to identify the most effective time window.

3. Conversational Approach

Since longer calls increase the likelihood of acceptance, operators could be encouraged to spend more time explaining the product. An initial phase of active listening is suggested to understand the customer's needs before presenting the offer.

4. Communication Adapted to the Economic Context

During periods of rising inflation, it would be appropriate to highlight the term deposit as a protection against loss of purchasing power. Similarly, in a context of labor market uncertainty, emphasizing the security and predictability of this financial instrument could be beneficial.

Appendix

The predictive model was developed using logistic regression with a logit link function. The assumptions required for its application are satisfied. The model's McFadden R^2 is 53%, indicating a good fit to the data.

Furthermore, the model was validated by splitting the dataset into training and test sets. The accuracy on the test set is **85.9%,** while it is approximately **85.3%** on the training set, indicating no tendency toward overfitting. The model's AUC is 0.859, reflecting a strong ability to distinguish between the two target classes.