

Mortgage Backed Securities

Prepayment Risk Analysis Report



Project Objective

To Summarize key findings from the analysis by creating a dashboard and provide actionable recommendations for Prepayment risk mitigation based on the insights gained.

Data Preprocessing

- ❖ The first step involves the data preprocessing step where raw data has been cleaned by removing null values and also those columns which are not useful in the further data analysis.
- ❖ It also involves data encoding of some of the columns like 'IsFirstTiime'.
- ❖ New columns such as 'CreditRange', 'LTV_range', and 'Repay_range' are created which contains categories.

Data Modelling and Dashboard Design

- ❖ The processed and cleaned data is then exported to power bi to create KPIs and visualizations.
- ❖ New measures for 'Prepayment Rate', 'Delinquency Rate', 'Average Months Delinquent' and 'Total Number of Loans' are created using DAX queries.
- ❖ New Group for DTI having categories High, Medium and Low is created using DAX query.
- ❖ New Maturity Date column having date format is created using the following DAX query:
MaturityDateFormatted =
DATE(
LEFT([MaturityDate], 4),
RIGHT([MaturityDate], 2),
1)

DAX Queries

Delinquency Rate =

```
VAR NumDelinquentLoans = CALCULATE(COUNTROWS('LoanExport(Cleaned)'),  
'LoanExport(Cleaned)'[EverDelinquent] = 1)  
VAR TotalLoans = COUNTROWS('LoanExport(Cleaned)')  
RETURN  
DIVIDE(NumDelinquentLoans, TotalLoans, 0) * 100
```

Prepayment Rate =

```
VAR NumPrepaidLoans = CALCULATE(COUNTROWS('LoanExport(Cleaned)'),  
'LoanExport(Cleaned)'[MonthsInRepayment] = 1)  
VAR TotalLoans = COUNTROWS('LoanExport(Cleaned)')  
RETURN  
DIVIDE(NumPrepaidLoans, TotalLoans, 0) * 100
```

DAX Queries

Average Months Delinquent = AVERAGE('LoanExport(Cleaned)'[MonthsDelinquent])

Total Number of Loans = COUNTROWS(DISTINCT('LoanExport(Cleaned)'[LoanSeqNum]))

DTI(Group) = IF(
 [DTI] <= 10,
 "Low",
 IF(
 [DTI] <= 40,
 "Medium",
 "High"))

Prepayment Risk Analysis of Mortgage Backed Securities

210K

Total Number of Loans

0.15

Prepayment Rate

19.48

Delinquency Rate

2

Average Months Delinquent

Total Number
of Loans by
CreditRange

Good

72K

Excellent

56K

Fair

54K

Poor

DTI(Group)

High

Low

Medium

LTV_range

High

Low

Medium

Year

All

Month

All

Repay_range

All

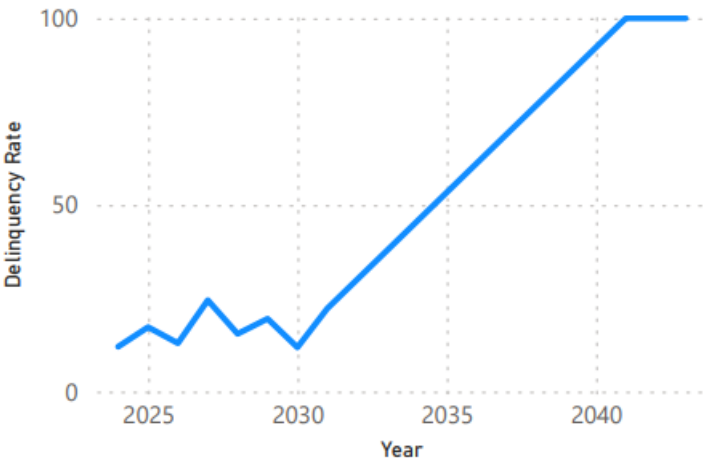
PropertyState

All

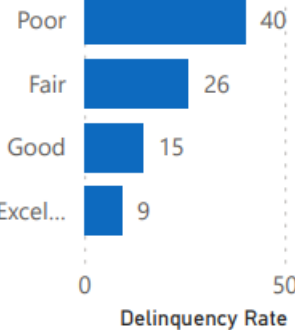
PropertyState



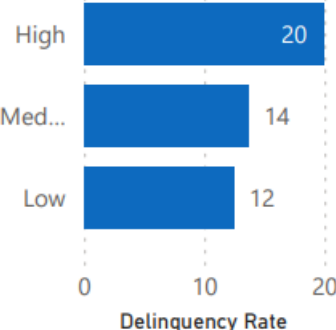
Delinquency Rate by Year



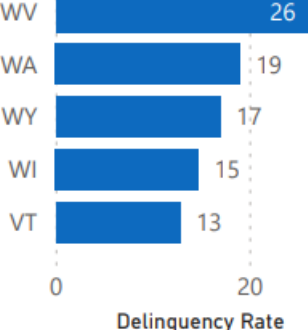
Delinquency Rate by
CreditRange



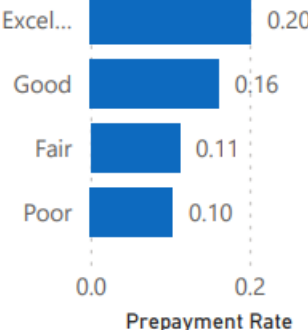
Delinquency Rate by
LTV_range



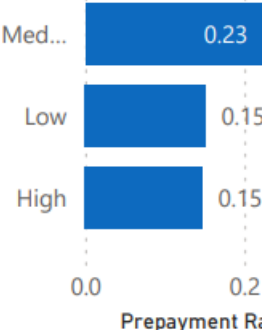
Delinquency Rate by
PropertyState



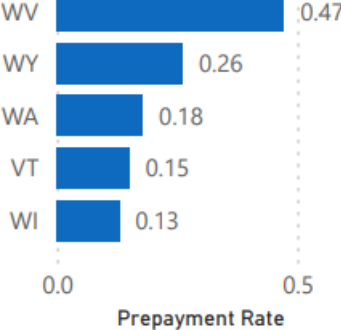
Prepayment Rate by
CreditRange



Prepayment Rate by
LTV_range



Prepayment Rate by
PropertyState



Project Insights

- The Delinquency Rate data reveals significant fluctuations over the years, with extreme spikes in 2041 and 2043 at 100%. To mitigate prepayment risks, it's crucial to investigate these fluctuations and address underlying causes. Diversifying the loans and strengthening the risk management framework are also essential.
- The Prepayment Rate data reveals that borrowers with higher credit scores (Excellent: 0.20, Good: 0.16) have higher prepayment rates compared to those with lower scores (Fair: 0.11, Poor: 0.10). To mitigate prepayment risks, lenders should offer special loan features and incentives to keep high-credit-score borrowers. They can also use penalties for early payoffs, offer refinancing options, and use data to predict who might pay off early.

Project Insights

- The bar chart between Delinquency Rate and LTV_Range shows that as Loan-to-Value (LTV) ratios increases, delinquency rates also go up: 12.41% for low LTV, 13.65% for medium LTV, and 19.91% for high LTV. This suggests higher risk for borrowers with higher LTV ratios, possibly due to financial challenges or changes in property values. To reduce the risk of missed payments, lenders should carefully assess borrowers with high LTV ratios, offer flexible loan options, provide financial education, monitor loans closely, and adjust pricing strategies based on the level of risk. These steps can help maintain loan stability and lower delinquency rates.
- The bar chart between Prepayment Rate and LTV_Range shows that borrowers with medium Loan-to-Value (LTV) ratios (25-50) are more likely to pay off their loans early compared to those with low (< 25) or high (50-1000) ratios. To manage this prepayment risk, lenders should offer flexible loan options, consider penalties for early repayment, educate borrowers on financial planning, and monitor trends to adapt their strategies accordingly for each LTV range.