Prepayment Risk Analysis Dashboard in Power BI

1. Data Loading and Preparation

a. Import Dataset

- Open **Power BI Desktop**.
- Go to **Home** > **Get Data** > **Excel** (or appropriate data source) and import your dataset.

b. Data Cleaning

- Review the dataset for any missing or inconsistent data.
- Replace value in credit score 0 to 850

2. Data Transformation

a. Convert MaturityDate to Date Format

- Open **Power Query Editor** by clicking on **Edit Queries**.
- Locate the **MaturityDate** column.

In modelling tab enter formula `MaturityDateColumn =`

```
DATE(LEFT('LoanExport'[MaturityDate], 4),
RIGHT('LoanExport'[MaturityDate], 2), 1)
```

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- Click on the drop-down arrow > **Date** > Select desired date format or use **Transform** > **Data Type** > **Date**.

b. Create Calculated Columns (if needed)

- **Credit Range**: Convert the credit score range (0-850) bins <=650,<=700,<=750,<=900 into categories like Poor, Fair, Good, Excellent.
- **DTI Range**: Create bins or categories based on the Debt-to-Income (DTI) ratio range (0-65).
- Bins like <=10,<=40<=100 Categories like Low,Medium,High
- **LTV Range** create bins <=25,<=50,<=1000 ,categories Low,Medium,High

- **Repay Range from months in repayment** bins<=48,<=96,<=144,<=192,<=240,categories like Poor, Fair, Good, very good,Excellent
- **IS First Time from first time home buyer** filter out X and keep rows only contain Y,N

3. Data Modeling

a. Create Measures (for KPIs)

- **Prepayment Rate**:
  DAXCopy code Prepayment Rate =
  VAR NumPrepaidLoans = CALCULATE(COUNTROWS('YourTableName'),
  'YourTableName'[MonthsInRepayment] = 1)
  VAR TotalLoans = COUNTROWS('YourTableName')
  RETURN
  DIVIDE(NumPrepaidLoans, TotalLoans, 0) * 100
- **Delinquency Rate**:
  DAXCopy code Delinquency Rate =
  VAR NumDelinquentLoans = CALCULATE(COUNTROWS('YourTableName'),
  'YourTableName'[EverDelinquent] = 1)
  VAR TotalLoans = COUNTROWS('YourTableName')
  RETURN
  DIVIDE(NumDelinquentLoans, TotalLoans, 0) * 100
- **Total Number of Loans**:
  DAXCopy code Total Number of Loans =
  COUNTROWS(DISTINCT('YourTableName'[LoanSeqNum]))
- **Average Original UPB**:
  DAXCopy code Average Original UPB = AVERAGE('YourTableName'[OrigUPB])
- **Average Original Interest Rate**:
  DAXCopy code Average Original Interest Rate =
  AVERAGE('YourTableName'[OrigInterestRate])

- **Average Loan Term**:

```
DAXCopy code Average Loan Term = AVERAGE('YourTableName'[OrigLoanTerm])
```

4. Dashboard Design

a. Prepayment Rate KPI

- Drag a **KPI visual** onto the report canvas.
- Set the **Value** to the **PrepaymentRate** measure.
- Set the **Goal** to the desired target (e.g., 100).
- Add a **Card visual** for **Total Number of Loans**.

b. Delinquency Rate KPI

- Add another **KPI visual**.
- Set the **Value** to the **DelinquencyRate** measure.
- Set the **Goal** to the desired target (e.g., 0).
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- **c. Total Number of Loans KPI:**
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  d. Average Original UPB KPI:
  e Average Original Interest Rate KPI:
  f. Average Loan Term KPI:
  -

. Loan Type Filter

- Add a **Slicer** visual.
- Drag the **ProductType** field to the **Values** area of the slicer.
- Customize the slicer to display loan types like Fixed-Rate, Adjustable-Rate, etc.

. Credit Range Filter

- Create a **Histogram** or **Bar Chart**.
- Use **CreditScore** and **PrepaymentRate** for the axis and values respectively.
- Use bins or categories for Credit Ranges (Poor, Fair, Good, Excellent).

. LTV Range Filter

DTI Range Filter

Date Filter

Loan filter

Loan purpose filter

- Create a **Scatter Plot** or **Grouped Bar Chart**.
- Use **LTV** and **PrepaymentRate/DelinquencyRate** for analysis.

f. Loan Purpose Filter

- Use a **Stacked Bar Chart** or **Grouped Bar Chart**.
- Compare **Loan Purpose** with **PrepaymentRate** and **DelinquencyRate**.

5. Final Touches

a. Formatting

- Apply consistent colors, fonts, and styles across visuals.
- Add titles, axis labels, and legends to enhance readability.

b. Tooltips and Interactivity

- Add tooltips to provide additional information on hover.
- Ensure slicers and filters interact with all related visuals for a dynamic dashboard.

c. Testing

- Test the dashboard with different filter selections to ensure accurate data representation.

Conclusion for Prepayment Risk Analysis

The Prepayment Risk Analysis dashboard provides valuable insights into the factors affecting loan prepayment rates within the dataset. Through this analysis, several key findings and implications emerge:

1. **Prepayment Behavior**:
    - The average prepayment rate across the dataset indicates that a significant portion of loans is being prepaid before maturity. This trend can impact the profitability and cash flow projections for lenders.
2. **Credit Score Influence**:
    - The credit score range has a discernible impact on prepayment rates. Borrowers with higher credit scores tend to have different prepayment behaviors compared to those with lower scores. This underscores the importance of creditworthiness in loan repayment dynamics.
3. **Loan Type Variation**:
    - The type of loan (e.g., fixed-rate, adjustable-rate) plays a role in prepayment behaviors. Understanding the characteristics and terms of each loan type can help lenders tailor their strategies to manage prepayment risks effectively.
4. **DTI Ratio Insights**:
    - The Debt-to-Income (DTI) ratio provides insights into borrowers' financial health and their capacity to manage debt. Loans with higher DTI ratios may exhibit different prepayment behaviors, warranting further exploration and segmentation in future analyses.
5. **Loan Purpose Considerations**:
    - The purpose of the loan (e.g., purchase, refinance) can influence prepayment rates. Borrowers' motivations and financial situations vary based on the loan purpose, which can impact their likelihood to prepay.
6. **Operational Implications**:
    - Lenders and financial institutions can use these insights to refine their loan origination, servicing, and risk management strategies. By understanding the factors driving prepayment risks, lenders can make informed decisions to mitigate risks and optimize profitability.

In conclusion, the Prepayment Risk Analysis dashboard offers a comprehensive view of the factors contributing to prepayment behaviors in loans. By leveraging this analysis, lenders can better understand their loan portfolios, identify potential risks, and develop targeted strategies to manage and mitigate prepayment risks effectively. Continuous monitoring and analysis are crucial to adapting to market dynamics, regulatory changes, and borrower behaviors to maintain a healthy and profitable loan portfolio.

Name:SANA NAZNIN