## A. Background

A company provides car-backed loans to dealers, where the loan amount is determined based on the vehicle's value. In the first half of 2024, the pricing team adjusted financing amounts for three car types. These adjustments influenced the number of loan transactions and default rates. The objective is to identify the optimal financing amount that maximizes total margin while maintaining a balance between risk and profitability.

Margin is determined as follows:

● **Repaid loans** yield **+5% margin** of the financing amount.

● **Defaulted loans** result in a **-30% margin** of the financing amount.

Analyzing historical loan performance enables the identification of patterns in profitability and risk, providing insights for optimal pricing decisions.

## B. SQL-Based Data Exploration

SQL queries were used to ensure data quality and support accurate analysis. Key validation steps included:

● **Completeness Check** – Identifying missing, null or duplicate values.

● **Loan Performance Analysis** – Aggregating loan count, total margin, and repayment outcomes per car type.

● **Risk Assessment (Default Rate%)** – Evaluating default rate variations across different financing amounts.

● **Risk-Adjusted Margin Calculation** – Measuring net profitability by incorporating default risk into margin analysis, ensuring a balanced view of financial performance.

Validation ensures data integrity, supporting reliable insights for financing decisions. The complete SQL script detailing all validation steps and analyses is available [here](#).

## C. Analysis & Insights

This analysis leverages Tableau for visualization with SQL being used to analyze the dataset and validate values before visualization in Tableau. This approach ensures the dashboard delivers accurate insights for informed decision-making.

The **"Car Loan Performance & Risk Analysis"** dashboard evaluates profitability and risk for each car type, with a **Car Type** filter positioned at the top left for easy selection.

# 1. KPI Analysis: Car Loan Performance & Risk Overview

**CAR LOAN PERFORMANCE & RISK ANALYSIS**

| Select Car Type | | Margin Profit (Rp) | Total Repaid Loan | Repayment Rate % |
|---|---|---|---|---|
| A | | Rp3,337,850,000 | 493 | 95.73% |

| Total Margin (Rp) | Total Loan | Margin Loss (Rp) | Total Defaulted Loan | Default Rate % |
|---|---|---|---|---|
| Rp2,436,200,000 | 515 | -Rp901,650,000 | 22 | 4.27% |

| Select Car Type | | Margin Profit (Rp) | Total Repaid Loan | Repayment Rate % |
|---|---|---|---|---|
| B | | Rp2,674,875,000 | 239 | 91.92% |

| Total Margin (Rp) | Total Loan | Margin Loss (Rp) | Total Defaulted Loan | Default Rate % |
|---|---|---|---|---|
| Rp1,252,875,000 | 260 | -Rp1,422,000,000 | 21 | 8.08% |

| Select Car Type | | Margin Profit (Rp) | Total Repaid Loan | Repayment Rate % |
|---|---|---|---|---|
| C | | Rp2,695,825,000 | 207 | 92.00% |

| Total Margin (Rp) | Total Loan | Margin Loss (Rp) | Total Defaulted Loan | Default Rate % |
|---|---|---|---|---|
| Rp1,276,525,000 | 225 | -Rp1,419,300,000 | 18 | 8.00% |

This analysis evaluates profitability and risk across different car types based on loan performance.

- **Car Type A**

  Car Type A is the most profitable, with the highest total margin (Rp2.436.200.000) and the most repaid loans (493 out of 515, repayment rate of 95.7%). The default count is the lowest (22 loans), leading to the smallest margin loss (Rp901.650.000).

- **Car Type B**

  Car Type B shows a higher risk, with 21 out of 260 loans defaulted (default rate of 8.1%). While it still achieves a positive total margin (Rp1.252.875.000), the margin loss (Rp1.422.000.000) is higher than Car Type A due to a lower repayment rate (92%). This suggests that the financing amount might need adjustments to reduce risk.
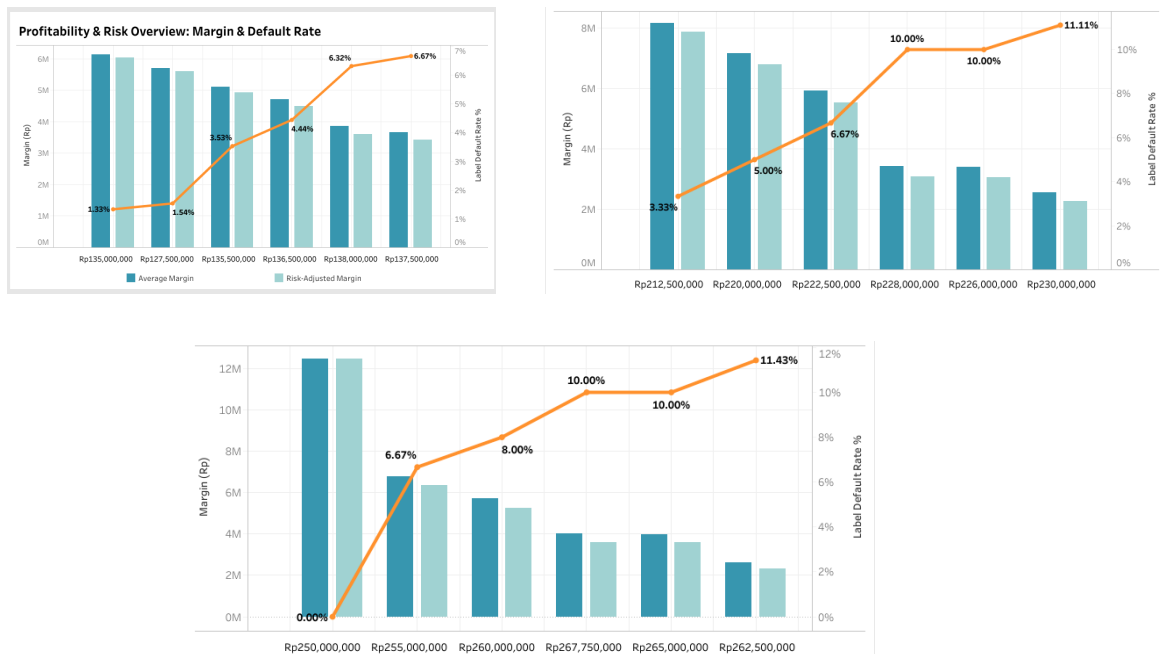
- **Car Type C**

  Car Type C has the highest default rate (8%, with 18 out of 225 loans defaulted) and a total margin of Rp1.276.525.000 similar to Car Type B. However, the margin loss (Rp1.419.300.000) remains high, showing that the default impact is just as significant.

The relatively lower repayment count (207 repaid loans) indicates room for improvement in pricing or loan approval criteria.

## 2. Profitability & Risk Overview: Margin & Default Rate

This chart evaluates how financing amount affects average margin, default rate, and risk-adjusted margin across different car types.



**Car Type A**

- The highest risk-adjusted margin occurs at Rp135.000.000 financing amount, with a low 1.33% default rate, making it the most efficient configuration.
- As financing increases, default rates rise significantly (from 1.33% to 6.67%), leading to a gradual drop in risk-adjusted margin (falling to Rp3.422.222 at Rp137.500.000).
- The steepest decline happens beyond Rp136.500.000, where defaults exceed **4%**, suggesting an upper limit where profitability begins to erode.

**Car Type B**

- The best-performing financing amount is Rp212.500.000, achieving the highest risk-adjusted margin (Rp7.874.306) with a 3.33% default rate.
- Beyond Rp220.000.000, default rates exceed 5%, and margins start declining, reaching as low as Rp2.271.605 at Rp230.000.000 financing amount (with an 11.11% default rate).

- Financing amounts above Rp226.000.000 show diminishing returns, indicating a higher sensitivity to risk.

**Car Type C**

- The most profitable loan structure is at Rp250.000.000, with a zero default rate and the highest risk-adjusted margin (Rp12.500.000).
- However, as financing exceeds Rp255.000.000, default rates climb (6.67% to 11.43%), and the risk-adjusted margin drops by almost half to Rp2.325.000 at Rp262.500.000 financing amount.
- A financing cap around Rp255.000.000 could balance profitability and risk without sharp margin losses.

## D. Summary

### Car Type A: Optimal Balance at Rp135,000,000

- Best financing amount: Rp135,000,000, yielding the highest risk-adjusted margin (Rp6,038,400) with a low 1.33% default rate.
- Increasing financing beyond Rp136,500,000 leads to a sharp rise in default rates (4.44% to 6.67%), reducing profitability.
- **Recommendation:** Maintain financing at Rp135,000,000 to optimize margin while keeping risk low.

### Car Type B: Controlled Risk at Rp212,500,000

- Best financing amount: Rp212,500,000, with a risk-adjusted margin of Rp7,874,306 and a manageable 3.33% default rate.
- Beyond Rp220,000,000, default rates increase (5% to 11.11%), rapidly cutting into profits.
- **Recommendation:** Set financing at Rp212,500,000 to maximize profitability without crossing into high-risk territory.

### Car Type C: Peak Profitability at Rp250,000,000

- Best financing amount: Rp250,000,000, delivering the highest risk-adjusted margin (Rp12,500,000) with zero defaults.

- Financing beyond Rp255,000,000 sees a steep rise in default rates (6.67% to 11.43%), leading to drastic margin drops.
- **Recommendation:** Cap financing at Rp250,000,000 to maximize returns while maintaining a 0% default rate.

Each car type has a clear financing sweet spot where margins are maximized while risk remains controlled. Keeping financing within these thresholds ensures sustainable profitability without excessive defaults.

## E. Further Analysis for Deeper Insights

Beyond the profitability and risk overview, additional charts were analyzed to gain a more comprehensive understanding of the loan performance:

1. **Margin vs. Risk: Finding the Sweet Spot**
   - A scatter plot with risk-adjusted margin on the y-axis and financing amount on the x-axis.
   - Default rate percentages are displayed as text labels to highlight the relationship between loan pricing and risk.

2. **Total Loans & Margin Performance Over Time**
   - A line chart showing the number of total loans and total margin across months, helping to identify trends and seasonality in loan performance.

3. **Repaid vs. Defaulted: Loan Distribution**
   - A stacked bar chart visualizing the proportion of repaid vs. defaulted loans across different financing amounts, providing insights into risk concentration at various pricing levels.

These visualizations can be accessed iteratively through [link], along with the complete SQL queries used for analysis at [link].