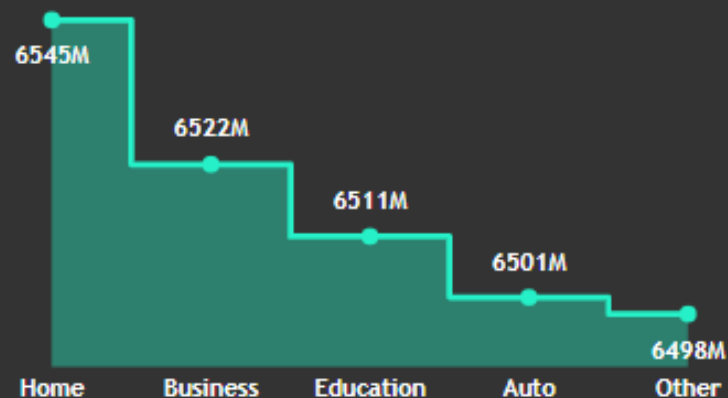# Loan Default Analysis

Project Objective

Hitch Credits is a financial firm aiming to leverage its underutilized loan and customer data to reduce default rates and drive business growth. This project focuses on uncovering key insights into customer behavior, loan performance, and risk factors to support data-driven decision-making.
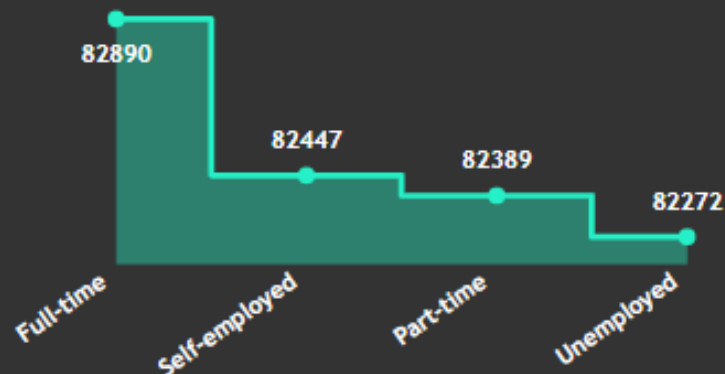
Project Steps

- Load the data into SQL server

- Create the Dataflow using Power BI services

- Importing into Power BI desktop from Dataflow

- Analyze, clean and create report

- Set up Schedule Refresh for Dataflow

- Publish the report to Power BI services

- Set up schedule Refresh for Report
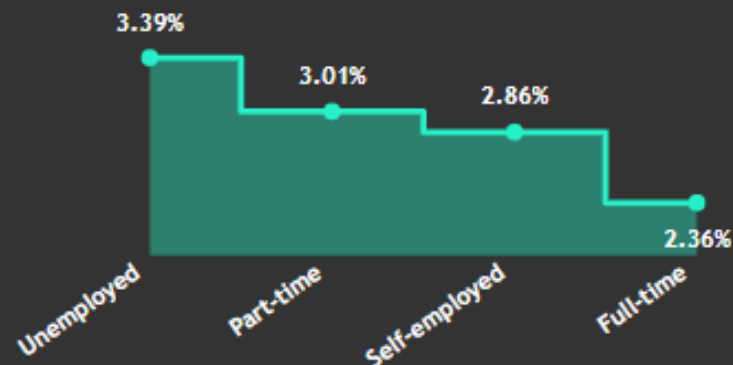
Loan Default & Overview
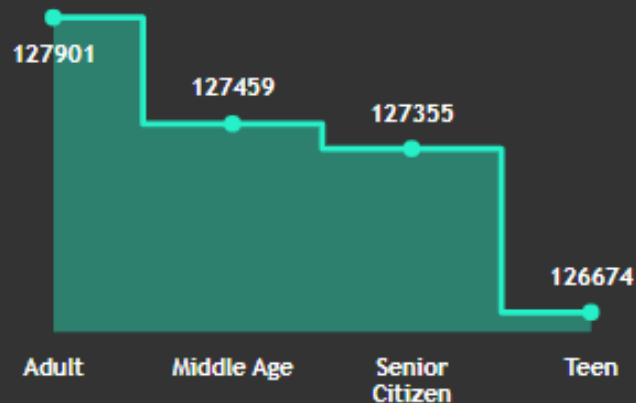
Loan Amount by Purpose

6545M
6522M
6511M
6501M
6498M

Home Business Education Auto Other

Income by Employment Type

82890
82447
82389
82272

Full-time Self-employed Part-time Unemployed

Default Rate by Employment Type

3.39%
3.01%
2.86%
2.36%

Unemployed Part-time Self-employed Full-time

Average Loan Amount by Age Group

127901
127459
127355
126674

Adult Middle Age Senior Citizen Teen

Default Rate by Year

11.62%
11.50%
11.70%
11.75%
11.50%
11.60%

2013 2014 2015 2016 2017 2018
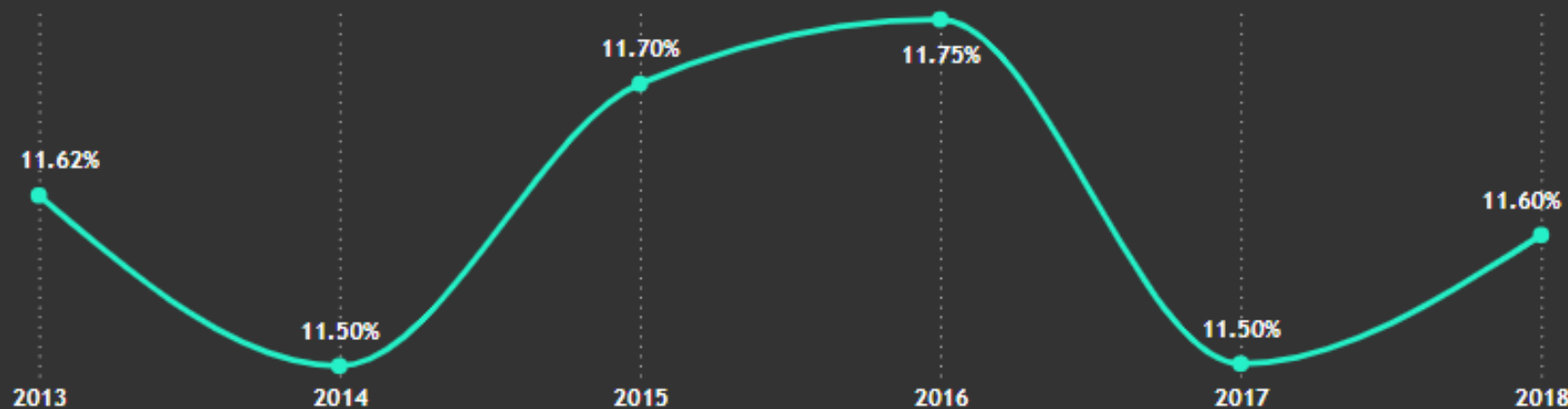
Applicant Demographic & Financial Profile

Median Loan Amount by Credit Score Category

127856 — Medium
127542 — High
127515 — Very Low
127398 — Low

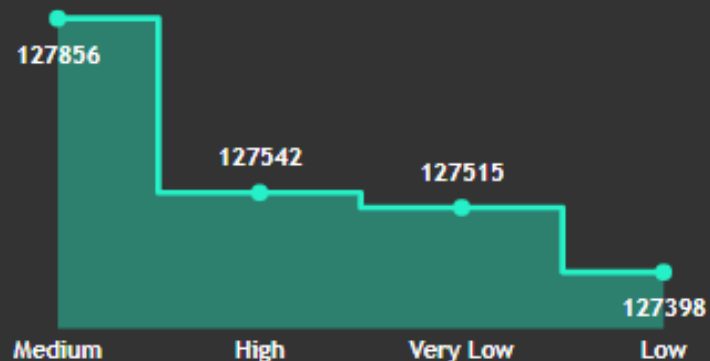## Average Loan Amount("High" Credit Score) by Age group & Marital Status

129.44K (8.47%)
127.92K (8.37%)
125.11K (8.19%)
128.46K (8.4%)
124.75K (8.16%)
128.3K (8.39%)
126.95K (8.31%)
128.07K (8.38%)
126.96K (8.31%)
127.53K (8.34%)
127.65K (8.35%)
127.41K (8.34%)

AgeGroup
- Adult
- Senior Citizen
- Middle Age
- Teen
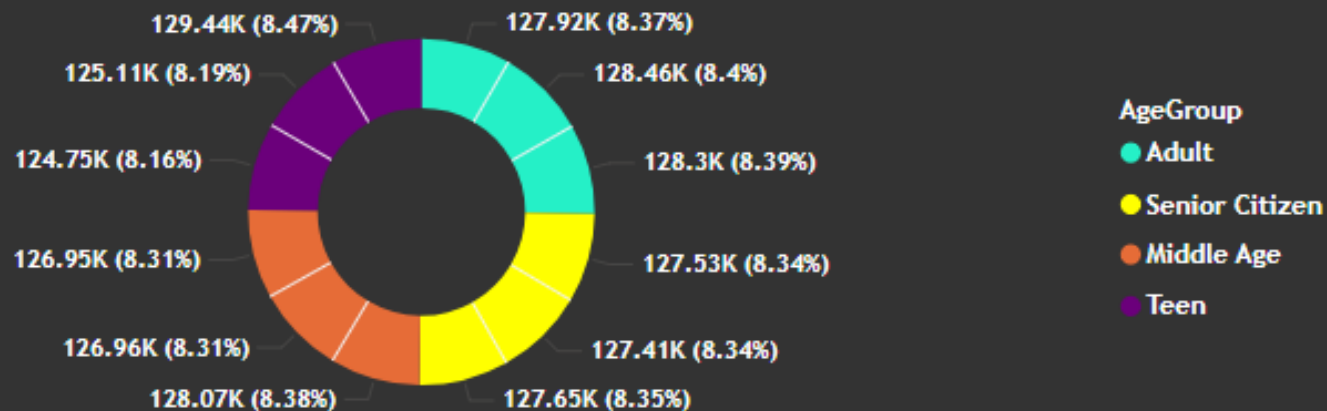
Loan Amount (Adult Age Group) by Credit Score Category

5.7bn — High
2.3bn — Very Low
2.3bn — Medium
2.3bn — Low
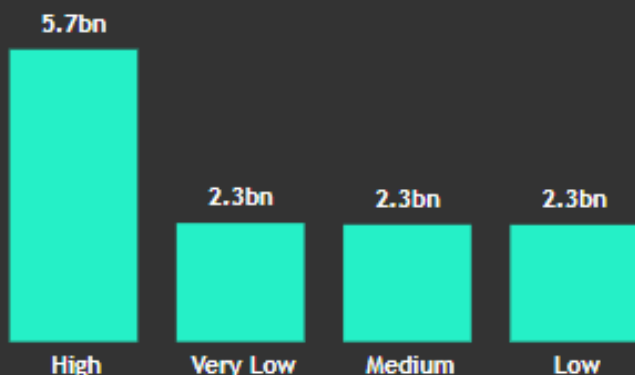
Loan Amount (Middle Age Group) by Mortgage and Dependents

HasDependents ● False ● True

3.1bn 3.1bn — True
3.1bn 3.1bn — False

Loan Amount by Education Type

64366 — Bachelor's
63903 — High School
63541 — Master's
63537 — PhD
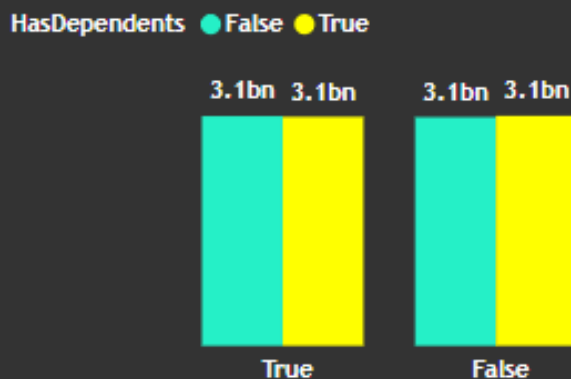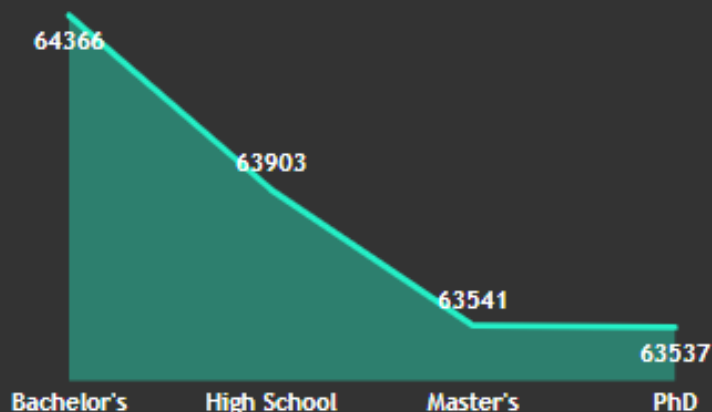
Financial Risk Metrics

YoY Loan Growth Rate

● YoY Loan amount growth   ● YoY Default Rate change

0.000
0.00%

-0.010
-1.53%

1.30%
0.017

0.004
-0.01%

-0.021
-1.08%

1.73%
0.008

2013   2014   2015   2016   2017   2018
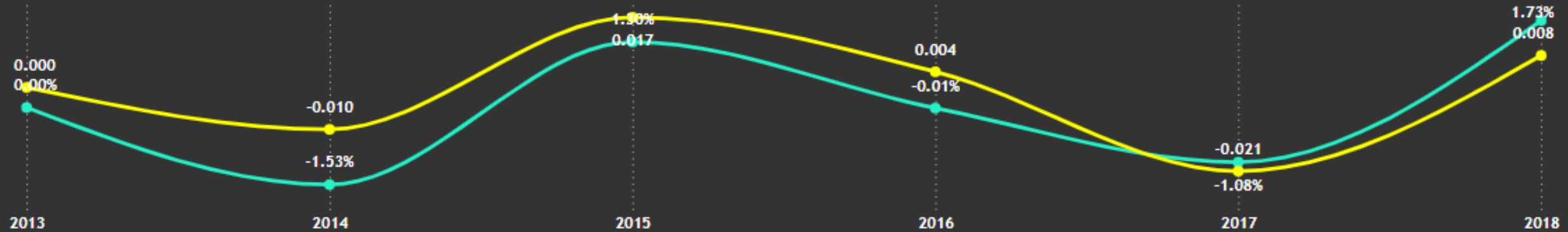
Loan Amount by Education Type & Marital Status

MaritalStatus ● Divorced ● Married ● Single

0.8bn
0.8bn
0.8bn

0.4bn   0.3bn   0.3bn
0.3bn   0.3bn   0.3bn
0.3bn   0.3bn   0.3bn

High   Very Low   Low   Medium

Income bracket ✕   MaritalStatus ✕
Ultra High

Sum of LoanAmount
32576880572

Ultra High
14463488214

High
7267921088

Medium

Divorced
4834764216

Single
4820132287

Married
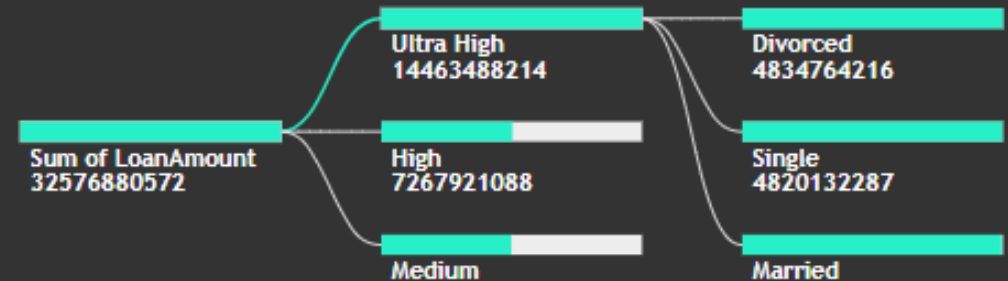
DAX Measures used

```
Average Income by Employee Type = CALCULATE(
                                  AVERAGE(Loan_default[Income]),
                                  ALLEXCEPT(Loan_default, Loan_default
                                  [EmploymentType])
)
```

```
Average Loan Amount by Age Group = AVERAGEX(
                                   VALUES(Loan_default[AgeGroup]),
                                   AVERAGE(Loan_default[LoanAmount])
)
```

DAX Measures used

```
Default Rate by Employment Type = CALCULATE(
                    DIVIDE(
                    CALCULATE(COUNTROWS(Loan_default),
                    FILTER(Loan_default, Loan_default[Default]=TRUE())),
                    ALLEXCEPT(Loan_default, Loan_default
                    [EmploymentType])),

                    CALCULATE(COUNTROWS(Loan_default),
                    ALL(Loan_default))),
                    ALLEXCEPT(Loan_default, Loan_default
                    [EmploymentType])
)
```

DAX Measures used

```
Default Rate by Year = DIVIDE(
                CALCULATE(COUNTROWS(Loan_default),
                FILTER(Loan_default, Loan_default[Default]=TRUE()),
                ALLEXCEPT(Loan_default, Loan_default[Year])),

                CALCULATE(COUNTROWS(Loan_default),
                ALLEXCEPT(Loan_default, Loan_default[Year]))
)
```

```
Total Loan Amount = SUM(Loan_default[LoanAmount])
```

DAX Measures used

```
Average Loan Amount for High Credit Score = CALCULATE(
                        AVERAGE(Loan_default[LoanAmount]),
                        FILTER(Loan_default, Loan_default
                        [CreditScoreCategory] = "High"))
```

```
Loan Amount by Education = CALCULATE(
                        COUNTROWS(Loan_default),
                        ALLEXCEPT(Loan_default, Loan_default[Education]))
```

```
Median Loan Amount by Credit Score Category = MEDIANX(
                        VALUES(Loan_default[CreditScoreCategory]),
                        MEDIAN(Loan_default[LoanAmount])
)
```

DAX Measures used

```
Total Loan Adult = SUMX(
                FILTER(Loan_default, Loan_default[AgeGroup] = "Adult"),
                Loan_default[LoanAmount]
)
```

```
Total Loan for Middle Age = SUMX(
                    FILTER(Loan_default, Loan_default[AgeGroup] = "Middle
                    Age"),
                    Loan_default[LoanAmount]
)
```

```
YTD loan amount = CALCULATE(
            SUM(Loan_default[LoanAmount]),
            DATESYTD(Loan_default[Loan_Date_DD_MM_YYYY]),
            ALLEXCEPT(Loan_default, Loan_default[CreditScoreCategory],
            Loan_default[MaritalStatus])
)
```

DAX Measures used

```
YoY Loan amount growth =
    VAR current_year_loan = CALCULATE(
                        SUM(Loan_default[LoanAmount]),
                        Loan_default[Year] = MAX(Loan_default[Year])
                        )


    VAR previous_year_loan = CALCULATE(
                        SUM(Loan_default[LoanAmount]),
                        Loan_default[Year] = MAX(Loan_default[Year])-1
                        )
    RETURN
        DIVIDE(
            CALCULATE(current_year_loan - previous_year_loan), previous_year_loan, 0
            )
```

DAX Measures used

```
YoY Default Rate change =
    VAR default_count_current_year = CALCULATE(COUNTROWS(Loan_default), Loan_default
    [year] = MAX(Loan_default[Year]), Loan_default[Default]=TRUE())
    VAR total_loan_count_current_year = CALCULATE(COUNTROWS(Loan_default), Loan_default
    [Year] = MAX(Loan_default[Year]))
    VAR default_count_previous_year = CALCULATE(COUNTROWS(Loan_default), Loan_default
    [Year] = MAX(Loan_default[Year]) -1, Loan_default[Default] = TRUE())
    VAR total_loan_count_previous_year = CALCULATE(COUNTROWS(Loan_default),
    Loan_default[Year] = MAX(Loan_default[Year])-1)
    VAR default_rate_current_year = DIVIDE(default_count_current_year,
    total_loan_count_current_year, 0)
    VAR default_rate_previous_year = DIVIDE(default_count_previous_year,
    total_loan_count_previous_year, 0)
    RETURN
        DIVIDE(CALCULATE(default_rate_current_year - default_rate_previous_year),
        default_rate_previous_year, 0
        )
```

Report Insights

Loan Default & Overview

- Unemployed individuals show the highest default rate (3.39%), while full-time employed show the lowest (2.36%).

- Default rate peaked in 2016 (11.75%) and dipped in 2014 & 2017 (11.50%), indicating cyclic risk.

- Home and Business loans are the most common (~$6545M & ~$6522M respectively).

- Full-time employees earn the highest average income (~$82.8K), indicating better repayment capacity.

Applicant Demographics & Behavior

- Medium credit score category applicants consistently receive larger loans.

- Bachelor's degree holders take the highest average loans (~$64.3K).

- In the adult age group, high credit score applicants gets the highest loan amount

Financial Risk & Growth Metrics

- 2018 saw the highest YoY loan growth (1.73%) with a marginal increase in default rate.

- 'Ultra High' income group contributes significantly (~$1.44B), mainly among single/divorced customers

Business Recommendations

1. Strengthen screening for unemployed/part-time applicants to reduce defaults.

2. Promote lending to full-time employed and high credit score individuals.

3. Personalize offerings for adults with strong income and education backgrounds.

4. Use demographics (age, credit score, marital status) to segment offers.