# Title: Exploratory Data Analysis of RML in Hong Kong

# Agenda

1, Introduction

2, Methodology

3, Result

4, Conclusion

# 1, Introduction

## 1.1, Background

RMLs are a major source of financing for property purchases in Hong Kong. Given the high property prices in Hong Kong, most home buyers rely on mortgages to fund their purchases.

* Hong Kong has among the highest property prices in the world so most home buyers in Hong Kong rely on mortgages  
  (<https://www.cobaltrecruitment.co.uk/blog/2019/08/the-top-10-most-expensive-cities-to-buy-property-in-the-world?source=google.com>)
* Majority of total household debt: RMLs are by far the largest debt class financing households in Hong Kong (71% RML, 22% Personal Loans, 7% Credit Card), highlighting their systemic importance to the financial system. Fluctuations in the RML market could therefore greatly impact households' debt servicing ability as well as the overall level of indebtedness.
* Huge size of RML market: As of 2022, outstanding RMLs from the banking sector accounted for more than 60% (Outstanding Loan - 1.81 Tn / GDP – 2.84 Tn = 63.7%). Therefore, fluctuations in the RML market can have a significant impact on Hong Kong's property market, banks and overall economy.
  + Concentration Risk: With outstanding RMLs accounting for more than 60% of the GDP, there is a high concentration of credit exposure in the banking sector. This concentration of loans in the property market poses a potential credit risk if there is a downturn in the real estate sector. A significant decline in property prices or a rise in mortgage defaults could have a negative impact on the banking sector's asset quality.
  + Collateral Risk: RMLs are typically secured by the property being financed, which serves as collateral. In the event of a property market downturn, the value of the collateral may decline. If borrowers default on their mortgage payments and the collateral's value is insufficient to cover the outstanding loan amount, it can lead to credit losses for the banks.
  + Interest Rate Risk: Fluctuations in interest rates can also impact credit risk in the RML market. If interest rates rise significantly, borrowers with variable-rate mortgages may face higher monthly payments, increasing the risk of default. This could result in an increase in non-performing loans and credit losses for banks.

## 1.2, Objective

* Uncover trends and patterns on RML market: EDA allows us to uncover trends and patterns within the RML data in Hong Kong. By analyzing historical data, we can identify changes in borrower demographics, loan characteristics, and market dynamics. This information helps us understand the evolving nature of the RML market and adapt strategies accordingly.
* Gain insights into borrower and lender behavior: EDA provides valuable insights into borrower and lender behavior related to RMLs in Hong Kong. By examining the data, we can understand factors such as borrower preferences, usage patterns, and repayment behavior. Additionally, we can analyze lender strategies, risk management practices, and lending criteria. These insights enable better decision-making and optimization of services for both borrowers and lenders.
* Supports HKMA's functions – EDA facilitate financial surveillance by identifying risks early, policymaking by understanding transmission channels.
* Verify policy hypotheses: EDA allows us to test and verify hypotheses regarding the impact of policies on the RML market in Hong Kong. By analyzing the data, we can assess the effects of policy changes, such as regulatory adjustments or interest rate fluctuations, on loan performance, borrower behavior, and market dynamics. This verification facilitates evidence-based policy decision-making and ensures that policies are aligned with the needs of the market.

# 2, Methodology

* Data Collection
* Data Cleaning
* Data Transformation
* Data Analysis
* Data Visualization

## 2.1, Data Collection

Different macroeconomic and financial market data is found and listed. Here is some may help to do the analysis.

* RML statistics, HIBOR rates, deposit rates, deposit amounts from HKMA monthly reports
* Unemployment rate from Census and Statistics Department monthly reports

## 2.2, Data Cleaning

- Normalize the data structure from high level format

- Extracted time fields into separate columns of year, quarter and month for further analysis

- Converted nominal value into numerical format

- Renamed columns to be more descriptive and standardized

- Handled missing data through predefined rules

- Removed duplicate records with similar business meaning from the datasets

## 2.3, Data Transformation

- Filtering to the year after 2000

- Joining difference data set by time field

- Grouping & Aggregation

## 2.4, Data Analysis

- Descriptive Analysis: Description, distribution, trend

- Segmentation Analysis: Group by year, quarter

- Correlation Analysis

## 2.5, Data Visualization

- Line graph

- Bar chart

- Pie chart

- Heatmap

- Regression plot

# 3, Result

See notion

# 4, Conclusion

## 4.1, Summary

## 4.2, Further Improvement

- Automation

- Transform the past value to present value

- Wider scope of dataset (CPI, CCI)

- Other area (CL, IBL, Interconnectedness with China)