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Home Financing Analysis Taking Inflation and Variable Interest Rates into Account With Ordinary Annuities

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Abstract

This study aims to determine the effect of variable interest rates and inflation on the credit system, namely Home Ownership Credit (KPR) using the ordinary annuity approach. This KPR can be influenced by several factors, especially the variable interest rate and inflation factors that affect the total monthly installments that must be paid by customers. In this study, the ordinary annuity approach is used to determine the KPR installment payments by taking into account fluctuations in variable interest rates and inflation. By looking at interest rate and inflation data from year to year. The results of this study indicate that inflation affects people's purchasing power while interest rates affect the amount of installment fees that must be paid. It is hoped that this study can help customers to understand the risks that can occur regarding KPR facilities in economic dynamics.

Keywords: Variable interest rate, mortgage, inflation

1. Introduction

The need for a place to live is one of the basic human needs that must be met to support a decent life. However, in reality, not everyone can afford to buy a house in cash due to limited funds. Therefore, Home Ownership Credit (KPR) is a popular solution for people to have their dream home. Through the KPR scheme, people are given convenience by paying in installments over a certain period of time according to their financial capabilities (Apriantoro, 2023).

However, the mortgage payment process is inseparable from the influence of various economic factors, such as interest rates and inflation. Interest rates, which are additional costs of loans, are one of the main components in determining the amount of monthly installments. When interest rates fluctuate, especially on mortgages with variable interest schemes, the monthly installments that customers must pay can change, increasing uncertainty for borrowers (Cochrane, 2002).

On the other hand, inflation also has a significant impact on mortgage financing. High inflation can reduce people's purchasing power due to declining real income. This has a direct impact on customers' ability to pay mortgage installments. In fact, in a scenario of increasing inflation, the risk of default can be higher, especially for customers with fixed incomes that do not follow price increases.

One of the relevant theories in understanding the relationship between interest rates and inflation is the Fisher Equation, which states that the nominal interest rate is the sum of the real interest rate and the inflation rate. In other words, rising inflation tends to be followed by rising nominal interest rates, which further increases the credit burden.

This study aims to analyze how interest rates and inflation affect mortgage financing using the ordinary annuity approach. Through modeling based on historical data and possible economic scenarios, this study seeks to provide insight into the risks faced by banks and prospective home buyers. Thus, the results of this study are expected to be a reference for stakeholders, both in formulating housing policies and in helping the public understand the risks that may arise in the ever-changing economic dynamics.

2. Literature review

There are several studies that are relevant to the analysis of mortgage financing, which are conducted in this study. For example, high inflation can reduce people's purchasing power, thus affecting their ability to pay home installments. In addition, inflation affects the level of risk calculated by financial institutions, Samuelson & Nordhaus (1995), variable interest rates are more influenced by changes in monetary policy, such as changes in the benchmark

interest rate by the central bank, which can increase uncertainty for borrowers, Fabozzi (2005), Annuities are an effective tool in credit management, especially in determining predictable installment structures, also the annuity model is suitable for long-term financing such as mortgages, Van Horne & Wachowicz (2009).

3. Materials and Methods

3.1. Material

The data analyzed in this study are inflation data, interest rate data, and mortgage data, related data can be obtained from the history of the Central Statistics Agency (BPS), and banking or Bank Indonesia. The mortgage data required are the number of mortgages, the number of monthly installments, mortgage interest rates, and the level of bad credit.

3.2. Method

This study uses a quantitative approach because it focuses on calculations, numerical data analysis, and mathematical models to study the relationship between inflation, variable interest rates, and ordinary annuities in home financing. The ordinary annuity method is a method of payment or receipt made at the end of each period.

3.2.1 Analysis Method

This study describes the trends in inflation, interest rates, and annuity payments in mortgage schemes over a certain period.

Mathematical Model of Annuity:

Using the ordinary annuity formula:

$$PMT = \frac{PV.i}{1-(1+i)^{-n}}$$

PMT: Installment payments per period.

PV: Initial loan.

i: Interest rate per period.

n: Number of installment periods.

According to Fisher Equation

$$i_{nominal} = i_{real} + inflation$$

4. Results and Discussion

4.1 Simulation Results

The average house price in West Bandung Regency is Rp. 271,671,974.00, Rinjani Putri (2016). With an interest rate of 6%, BPS (2024), and inflation of 1.84%, BPS (2024). With an average installment period of 20 years,

Case 1 (real inflation):

$$\begin{aligned} i_{nominal} &= 6\% + 1.84\% \\ &= 7.84\% \end{aligned}$$

So that

$$PMT = \frac{271{,}671{,}974.00.\ (7.84\%)}{1-(1+7.84\%)^{-20}}$$

$$PMT = IDR\ 27{,}334{,}117.36/\text{Year}$$

Case 2 (higher inflation e.g. 2%):

$$i_{nominal} = 6\% + 2\% \\ = 8\%$$

So that

$$PMT = \frac{271{,}671{,}974.00\ (8\%)}{1 - (1 + 8\%)^{-20}}$$

$$PMT = IDR\ 27{,}674{,}114.62/\text{Year}$$

4.2 Discussion

Mortgage Financing Simulation with Inflation and Variable Interest Rates This study simulates a mortgage payment scenario based on the average house price in West Bandung Regency of IDR 271,671,974, an interest rate of 6%, and a 20-year installment period. The simulation results show significant differences in the amount of annual installments to be paid when inflation changes.

Real Inflation Case (1.84%) At real inflation of 1.84%, the amount of annual installments to be paid is lower compared to higher inflation. This reflects the effect of inflation on purchasing power, where controlled inflation keeps the installment burden relatively light.

High Inflation Case (2%) When inflation is raised to 2%, the annual installment increases. This shows how rising inflation can reduce people's purchasing power while increasing the total amount of installments that must be paid during the credit period.

Impact on Default Risk With higher inflation, the risk of default by customers also has the potential to increase, especially for people with fixed incomes who do not follow the increase in inflation. This study highlights the importance of considering economic scenarios in modeling mortgage financing.

Ordinary Annuity Formula The use of the ordinary annuity method in this study provides a systematic approach to modeling installments based on changes in inflation and interest rates. The formula used helps provide reliable simulation results for further analysis.

5. Conclusion

Inflation plays an important role in determining people's purchasing power. High inflation reduces real income, thus affecting customers' ability to pay mortgage installments. This shows the need for inflation stability to maintain the sustainability of home financing. Variable interest rate fluctuations directly affect the amount of monthly installments that customers must pay. Higher interest rates increase the total cost of credit, which can increase the risk of default. The ordinary annuity approach has proven effective in modeling mortgage payments. This method provides deep insights into the dynamics of mortgage payments under various economic scenarios. Customers: It is necessary to consider the risks arising from inflation and variable interest rates when taking out a mortgage facility. Payment simulations can help understand the financial burden in the future. Banking: It is important to manage risks by paying attention to macroeconomic factors such as inflation and interest rate policies to ensure the sustainability of the mortgage financing system. This research provides a useful reference for stakeholders in making policies that support access to affordable housing while maintaining economic stability in the property sector.

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