



Annuity in Advance for Rental Properties: Profit and Risk Analysis for Owners of Student Rental Homes Near Campus

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Abstract

Nowadays, the rental homes business in the area around the campus offers significant profits for its owners, this is due to the large number of students who migrate so they choose to live in rental homes, but on the other hand this can also cause various risks, including fluctuations. Maintenance costs and high occupancy rates. This can make rental homes owners' income unpredictable and make it difficult to create long-term financial goals. Using an upfront annuity model, where the owner receives rental payments at the start of the period, is one way to lower this risk. rental homes owners can guarantee more consistent cash flow and make more accurate income predictions by applying this concept. The aim of this research is to examine how the application of the advance annuity model affects the income and risks of rental homes owners. This study will assess how advance annuities contribute to income stability and reduce the uncertainty that often occurs in rental homes operations by using comprehensive financial techniques. Apart from that, this analysis will also consider various external factors that can influence occupancy levels, such as campus policies and economic conditions. It is hoped that the findings from this research will provide useful insights for rental homes owners in maximizing profits while managing risks more effectively, so that they can adapt to ever-changing market dynamics. Therefore, this strategy can be a smart alternative for rental homes owners in optimizing their business performance around campus.

Keywords: mathematics, advance annuity, campus housing business, risk management.

1. Introduction

Every human being has basic needs that need to be met in life, one of which is the need for shelter. rental is a term used to describe the human need for shelter or shelter, whether in the form of a homes, apartment, rental homes, or other form of residence that functions as a shelter from the weather and environmental dangers. Apart from physical functions, boards also have important social and psychological functions, namely as a place for families to gather and rest.

In student life, especially for those who migrate far from their hometowns to study, the need for housing is an important aspect that must be considered. Students who come from outside the city often choose to live in rental homes located near campus, because this option is more practical and affordable. This rental homes is temporary, according to their study period, and is largely influenced by limited financial conditions, considering that most students do not have a steady income to buy or build a homes near campus.

On the other side, this situation provides a very profitable option for rental homes owners. Providing rental homes as a place for students to live can be profitable, especially if there is a consistent influx of new students every year, thus ensuring a stable market. In addition, rental homes rental rates usually remain constant or even increase over time, so that owners can earn a steady income. Owners can increase the value of their rental homes and attract more tenants by improving facilities or services. Because they provide temporary accommodation for students and provide economic opportunities for their owners, dormitories are a win-win situation for both owners and renters especially students.

However, rental homes owners need to be prepared to face a number of risks that can affect the smooth running of their business. One of the main risks is tenant insecurity. Students who experience financial difficulties or are not good at managing their finances may be late in paying rent or not pay rent on time. Additionally, irresponsible use of facilities by tenants can cause damage, require additional repair costs, and reduce landlord profits. Competition with other rental homess that offer better facilities and more competitive prices is also a challenge for owners to further increase the attractiveness and quality of their services.

To overcome this risk, one solution that can be implemented by rental homes owners to overcome this risk is to use an annuity payment system in advance. In this model, renters are required to pay the cost of their stay at the beginning of the rental period for a certain period of time (eg semi-annually or annually). This system reduces the risk of late payments and irregular cash flow problems and guarantees rental homes owners receive income within the agreed time period. Prepayment allows rental homes owners to more easily plan maintenance and repairs to their facilities while reducing financial risks.

2. Literature Review

Research regarding student housing needs has been widely discussed in various international journals. A study by Smith and Holt (2007) shows that students tend to choose housing close to campus, considering aspects of price, comfort and security. However, this research has not touched on long-term financial aspects for residential owners, especially regarding income stability. Our research focuses on the application of annuity systems in rental homes business models, offering financial stability to rental homes owners with upfront payments that have not been widely discussed in previous literature.

In addition, research by Harrison and Phillips (2013) which discusses the dynamics of demand and supply for student housing shows that there is a stable market, but this research has not examined in depth how rental homes owners can mitigate financial risks such as late payments or price competition. This is where our research adds new insight by offering an annuity-based payment system as a solution.

The Baxter and Wylde (2015) study emphasizes the importance of managing rental homes operational risks, such as damage to facilities, but the annuity-based solution we offer provides an additional approach to reducing cash flow uncertainty and increasing the predictability of owner income. Thus, our research makes a new contribution by incorporating annuity concepts from the field of finance into the student rental homes rental industry, which has previously rarely been discussed.

3. Materials and Methods

3.1. Materials

The subject of this study is the implementation of an upfront annuity system by rental homes owners near Universitas Padjadjaran. Upfront annuity refers to a payment scheme in which tenants pay their rent at the beginning of the contract period, providing immediate income for the rental homes owners for operational or investment purposes. This research targets rental homes owners who have applied this system for at least six months, with a minimum of ten rented units. The study was conducted around Universitas Padjadjaran's campus in Sumedang Regency, chosen due to the high demand for rental homess in the area driven by a large student population.

The collected data includes both quantitative and qualitative information, such as the number of tenants making upfront payments, rental payment amounts, contract durations, market interest rates, inflation, and the rental homes owners' income and cash flow data.

Qualitative data includes the owners' satisfaction levels with the upfront annuity system and financial risks encountered, such as tenants defaulting on payments or terminating the contract prematurely.

For analysis, the study employs various tools from financial mathematics as well as statistical and financial software. Mathematical formulas are used to analyze data, such as calculating the total annuities received and determining the present value of cash flows. Additionally, risks are quantified using the Value at Risk (VaR) method to estimate potential losses.

Software such as Microsoft Excel is used for annuity calculations and financial simulations, while SPSS or R is employed for statistical and regression analyses. By combining these tools, the study conducts an in-depth analysis of the application of upfront annuities in managing rental homess, focusing particularly on the benefits and risks for the owners.

3.2. Methods

This study aims to analyze the benefits and risks of implementing upfront annuities using financial mathematics concepts, particularly those related to cash flows, the time value of money, and financial risk analysis. The methods employed involve mathematical modeling to assess the impact of upfront annuity implementation on rental homes owners, with a focus on income stability, cash flow, and financial risks.

3.2.1. Research Design

This is a quantitative study with a mathematical analysis approach, where the application of upfront annuities is evaluated using annuity formulas and the principles of the time value of money. The data used is obtained from rental homes owners who have implemented the upfront annuity system, with the analysis focused on the system's effects on cash flow, total income, and potential losses.

3.2.2. Population and Sample

The population of this study comprises rental homes owners near the university campus who use the upfront annuity payment system. The sample for this study is selected based on the following criteria:

1. Owners who have implemented the upfront annuity system for renting out rental homess for at least one year.
2. Owners with at least 10 rental units rented to students.

The sample size for this study includes 10 rental homes owners.

3.2.3. Data Collection Techniques

The data used consists of primary and secondary data:

(a) Primary Data

Primary data is collected through surveys using questionnaires that cover:

- The number of tenants making upfront payments.
- The duration of rental contracts.
- The amount of upfront payment (annuity).
- Risks related to tenants defaulting on payments or leaving before the contract ends.

(b) Secondary Data

Secondary data includes references from financial reports or studies related to annuities and property rentals, as well as relevant economic data such as inflation rates and market interest rates to calculate the time value of money.

3.2.4. Mathematical Model of Annuities

This study applies a financial mathematics approach using an upfront annuity model. The formulas employed include:

(a) Annuity in Advance Value Formula:

This formula is used to calculate the total payment received by rental homes owners over the contract period.

(b) Time Value of Money Calculation:

Each annuity payment received at the start of the period is converted to its present value. This provides an estimate of the profit gained by the rental homes owner when payments are made upfront compared to regular monthly payments.

3.2.5. Risk Analysis

For risk analysis, the study employs the Value at Risk (VaR) concept to estimate potential losses due to payment defaults or tenants canceling contracts prematurely. The VaR calculation provides an estimate of the maximum loss that may occur during the contract period.

3.2.6. Data Analysis

The collected data is analyzed using the following techniques:

(a) Financial Simulation:

Simulations are conducted with various interest rate and inflation scenarios to assess the impact of these variables on the annuity value received by the rental homes owner.

(b) Sensitivity Analysis:

Sensitivity analysis is used to examine how changes in variables such as interest rates or inflation rates affect the profitability and risks of the upfront annuity system.

(c) Comparative Analysis:

A comparison is made between cash flow and financial risk outcomes for owners using the upfront annuity system versus those employing a regular monthly payment system.

3.2.7. Validity and Reliability

The data is validated through reliability testing using Cronbach's Alpha to ensure the consistency of the questionnaire responses. Validity is tested through a pre-test conducted with a small group of rental homes owners before the main study.

3.2.8. Research Limitations

This study acknowledges several limitations:

(a) The results may be influenced by fluctuations in interest rates or economic conditions.

(b) The mathematical model used for analyzing upfront annuities does not account for external factors such as property price changes or tax policy adjustments that could affect the outcomes.

3.3. Equation

The formulas used in this research are as follows:

Annuity of Advance Formula:

$$A = P \left(\frac{1 - (1 + r)^{-n}}{r} \right) (1 + r) \quad (1)$$

with:

A : Total annuity received by the rental homes owner.

P : Monthly payment from the tenant.

r : Monthly interest rate.

n : Number of periods (months).

Time Value Calculation of Money:

$$PV = \frac{A}{(1 - r)^t} \quad (2)$$

with:

PV : Present value of cash flow.

A : Annuity received.

r : Interest rate per period.

t : Time (number of periods).

Value at Risk Formula:

$$\underline{\text{VaR}} = A \cdot z \cdot \sigma \quad (3)$$

with:

A : Total annuity amount.

z : Value of the normal distribution (e.g., 1.96 for a 95% confidence level).

σ : Standard deviation of expected cash flow.

4. Results and Discussion

4.1. Survey Questions and Respondent Answers

(a) How long have you been implementing the advance annuity payment system for your rental homes?

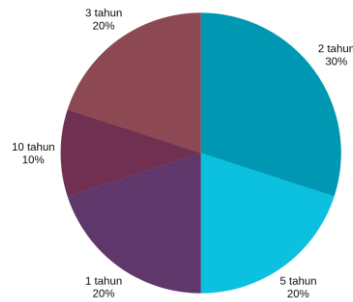


Figure 1: Pie Chart of Responses to Survey Question Number One

The responses indicate that the implementation of the advance annuity payment system varies among the participants. Two respondents have been using this system for 1 year, while three others reported a duration of 2 years. Additionally, two respondents stated they have applied the system for 3 years, another two for 5 years, and one respondent mentioned implementing it for as long as 10 years. This demonstrates a range of experiences with the system, reflecting both newer and long-term adopters.

(b) Why did you choose to implement the advance annuity payment system?

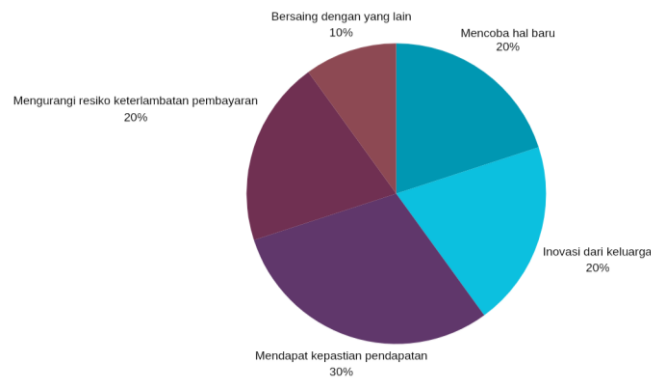


Figure 2: Pie Chart of Responses to Survey Question Number Two

The responses reveal various reasons for adopting the advance annuity payment system. Two respondents mentioned they wanted to try something new, while one cited competition with other property owners as the motivation. Two others stated that the system helps reduce the risk of late payments, and three emphasized that it provides income certainty. Lastly, two respondents implemented it as an innovation and based on suggestions from family members.

(c) Compared to the previous monthly payment system, is the advance annuity payment system more beneficial for you?

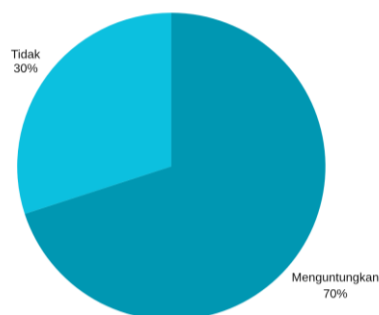


Figure 3: Pie Chart of Responses to Survey Question Number Three

Most respondents (seven out of ten) indicated that the advance annuity payment system is more beneficial compared to the previous monthly payment method. They highlighted that it ensures a steady cash flow and minimizes the hassle of monthly collection. However, three respondents felt that it was not more advantageous, mentioning challenges such as limited flexibility for tenants and potential difficulties in attracting new renters.

- (d) Have you encountered difficulties in managing rent payments after implementing this system?

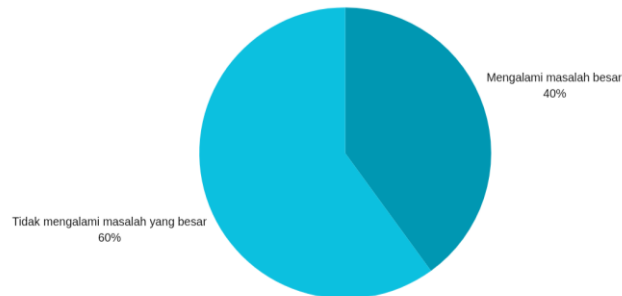


Figure 4: Pie Chart of Responses to Survey Question Number Four

Six respondents reported not facing significant problems in managing rent payments after implementing the advance annuity system. They found that the system helped streamline cash flow and reduce payment delays. However, four respondents mentioned experiencing significant challenges, such as issues with tenants who fail to pay on time or difficulties in managing the upfront payments for long-term planning.

- (e) To what extent has the advance annuity system helped improve the cash flow stability of your rental homes?

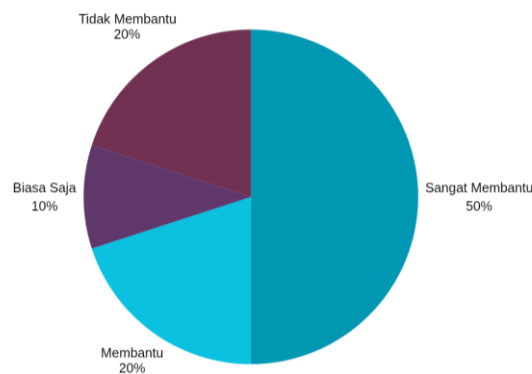


Figure 5: Pie Chart of Responses to Survey Question Number Five

Five respondents reported that the system has been very helpful in improving cash flow stability. They highlighted the benefit of receiving payments upfront, which allowed them to manage operational costs more effectively. Two respondents found it helpful but mentioned that occasional issues with tenant turnover still affected their cash flow. One respondent felt the system provided only moderate impact, and two respondents stated that the system did not significantly contribute to cash flow stability, often due to irregular tenant behavior or unexpected vacancies.

- (f) Have any tenants experienced difficulties in paying or leaving early?

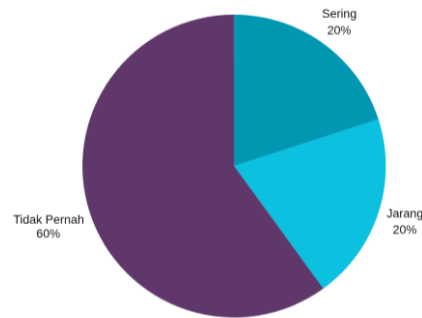


Figure 6: Pie Chart of Responses to Survey Question Number Six

Two respondents reported that it happens frequently, with tenants sometimes struggling to make payments or leaving before the contract ends. Two others mentioned that it happens occasionally but is not a common issue. However, six respondents stated that they have never faced such problems, indicating that the advance annuity system has helped reduce the risk of late payments or early departures.

4.2. Owner's Expenses

Here is the average expenditure from 10 owner's homess for the years 2020 to 2024, including electricity, water, wifi, repairs, and other expenses:

Table 1: The expenses of the property owner, which are one of the factors contributing to the benefits of Annuity Advance.

Year	Electricity	Water	Wi-Fi	Repairs	Etc	Total
2020	4,680,000	3,600,000	1,500,000	2,400,000	1,250,000	13,430,000
2021	4,670,000	3,600,000	1,700,000	3,000,000	1,000,000	13,970,000
2022	4,700,000	3,800,000	1,750,000	2,000,000	1,200,000	13,450,000
2023	4,650,000	3,500,000	1,790,000	1,000,000	1,600,000	12,540,000
2024	4,800,000	3,600,000	1,900,000	2,500,000	2,700,000	15,500,000

4.3. Annuity Calculation

The formula used to calculate upfront annuity payments is applied as follows:

$$A = P \left(\frac{1 - (1 + r)^{-n}}{r} \right) (1 + r) \quad (4)$$

If the owner's income per year is 72 million, then over 5 years and the ... is 12% p.a, using the present value of annuity formula, the result is:

$$A = 72,000,000 \times \frac{1 - (1 + 0.12)^{-5}}{0.12} (1 + 0.12) = 290,689,152$$

Meanwhile, using the method of regular payments per month or per year, the total is:

$$A = 72,000,000 \times 5 = 360,000,000$$

At first glance, it may seem that monthly payments are more advantageous, but there are many factors that can influence the fact that greater profits can be obtained through the present value annuity method. Issues such as students leaving or transferring from the boarding house, leading to suboptimal income, or many who are late in paying and unable to pay rent on time, require the landlord to have extra funds or capital for covering the expenses listed in Table 1.

4.4. Present Value (PV) Calculation

To calculate the PV, the formula used is:

$$PV = \frac{A}{(1+r)^t}$$

$$PV_1 = \frac{72,000,000}{(1+0.12)^1} = 64,285,714$$

$$PV_2 = \frac{72,000,000}{(1+0.12)^2} = 57,397,959$$

$$PV_3 = \frac{72,000,000}{(1+0.12)^3} = 51,248,178$$

$$PV_4 = \frac{72,000,000}{(1+0.12)^4} = 45,757,734$$

$$PV_5 = \frac{72,000,000}{(1+0.12)^5} = 40,854,734$$

$$\text{Total} = PV_1 + PV_2 + PV_3 + PV_4 + PV_5$$

$$\text{Total} = 259,543,887$$

From the calculations, it's evident that the difference between the total income using different payment methods (upfront vs. regular payments) is quite small. However, this doesn't account for several real-world factors that could significantly affect the kos owner's actual financial outcomes.

Payment Delays or Defaults

In real scenarios, tenants may delay their payments or fail to pay altogether. This disrupts the owner's cash flow, making it harder to cover operational expenses or other commitments on time. Upfront payment ensures that the owner has the funds in hand without relying on tenants' punctuality.

Inflation and Purchasing Power

Money received in later years has less purchasing power due to inflation. For example, IDR 72 million in year 5 will not buy the same amount of goods or services as IDR 72 million today. This loss in value means that the regular payment method might not be as beneficial in the long run.

Opportunity to Reinvest

With upfront payments (using an annuity due), the kos owner can reinvest the money immediately, potentially generating additional returns. For example, the funds could be placed in savings, mutual funds, or other investments, allowing the owner to benefit from compound interest over the years.

4.5. Risk Analysis Using VaR

Value at Risk (VaR) is employed to estimate potential losses arising from risks such as payment defaults or facility damage. The formula used is:

$$\text{VaR} = A \cdot z \cdot \sigma$$

At a 95% confidence level, this calculation provides insight into the maximum potential loss that rental homes owners could face.

Using the Value at Risk (VaR) approach in this case, we can estimate the potential loss a rental property owner might face due to risks like tenant defaults or facility damage. The formula used is essentially to subtract the product of a z-score (which represents the confidence level) and the standard deviation (which represents the fluctuation or uncertainty of income) from the expected income.

At a 95% confidence level, the z-score is 1.645, which indicates a high probability that losses will not exceed a certain amount. The standard deviation in this context would reflect how much income might vary due to risks like late payments or maintenance costs.

For example, if the average annual income is IDR 72 million, and we estimate that the standard deviation (based on past experience or similar data) is IDR 5 million, the VaR calculation would show the minimum amount the owner is likely to earn, accounting for these risks. This helps the owner understand their worst-case scenario and plan accordingly by having a financial buffer, insurance, or other risk mitigation strategies in place.

In summary, while the numerical calculation provides a threshold for potential losses, the real value of VaR lies in helping the property owner manage risk and make informed decisions, especially in the face of unpredictable challenges.

5. Conclusion

Based on the research findings, the annuity in advance system proves to be more advantageous for rental homes owners compared to the conventional monthly payment system. It offers better cash flow stability, improved financial risk management, and additional benefits, such as optimized calculations for Present Value (PV) and Value at Risk (VaR). For tenants, the system provides attractive incentives like discounts or extra facilities, enhancing its market appeal. However, there are drawbacks, such as potential income loss if tenants leave early and increased utility usage (e.g., electricity and water), as tenants may feel entitled to use more after paying upfront for the entire year.

Other limitations include the relatively small sample size, which may not fully represent the diversity of the rental homes business. External factors, like tenant behavior, property location, or market demand, were not thoroughly explored. Additionally, the models used in this study are simplified and do not fully capture the complexities of real-world dynamics.

Despite these limitations, this research offers valuable insights into the financial mechanisms of the rental homes sector and emphasizes the importance of balancing benefits and risks when adopting the upfront annuity system. Future research should consider the impact of external factors, such as economic conditions or tenant preferences across different market segments. A larger sample size and more advanced modeling would also improve the accuracy and applicability of future findings.

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