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THE IMPORTANCE OF FINANCIAL MATHEMATICAL ELEMENTS IN REAL ESTATE VALUATION

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Annotation: In this work elements of financial mathematics are considered, six functions over of compound interests are given, which is estimations cost of the real estate.

The usage of financial mathematics functions in the practice of estimation of cost of objects of the real estate promotes its validity, and also efficiency of making decision on investing in the real estate.

Keywords: Real estate, financial mathematical elements, valuation, complex interest, mathematical functions

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Introduction. Cash flows that originate at different points in time will have distinct values and can be compared by bringing them together at the same time. The worth of various cash flows can be determined not just by anticipated inflation, but also by objective economic policy. In economic calculations, specific approaches are typically applied through the financial mathematical functions that are now quoted to account for the inflation of the value of cash flows over time.

Materials and methods. The article discusses the issues of financial mathematical elements in the assessment of real estate on the basis of systematic, logical, functional analysis, methods of economic mathematical analysis.

However, the following sources were used to cover the article:

- Абдурахманов И.Ю. Оценка бизнеса: введение в практику оценки стоимости зданий и сооружений. - Т .: «NORMA», 2011 - 448 p.

- Ганиев К.Б., Ганиева Г.И.. Оценка бизнеса: Учебное пособие - Tashkent, KONSAUDITINFORM - NASHR, 2010. - 232 p.

- Raximov Z.O. Financial Mathematical Elements Used in the Real Estate Economy. Scientific and technical journal of architectural and construction problems No. 2. - Samarkand: 2014, pages 70-72.

Results. The process of bringing current and future value is called capitalization and discounting. Capitalization of cash flows is the process of bringing the current value of cash flows to their future value. Discounting cash flows is the process of bringing the value of future cash flows to the value of the current time frame.

Discounting cash flows is carried out by multiplying their value by The Discount coefficient of the current period.

The process of capitalizing and discounting cash flows is based on a complex percentage calculation.

Compound interest is the process of calculating by adding interest to the principal amount as well as unpaid interest. The formula for calculating the compound foizni is as follows

$$k_n = (1+r)^n$$

here, k_n – the coefficient of capitalization of phases n after a period;

r – annual rate of income (discount norm, discount rate, capitalization norm, income norm);

n – number of collected periods.

In practice, when assessing the effectiveness of investment projects, the following formula is usually used to determine the discount coefficient:

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

here, r – discount rate;

t – current period.

For example, it is used in the determination of such indicators, in the case of discounted income, the internal norm of income, the index of profitability of investment, etc. First of all, this is due to the fact that all indicators of cash flows are brought to the evaluation of the base moment, and the sum is decided on the direction of the purpose of investment realization on the basis of comparison of the listed investment costs and results.

The main functions of financial mathematics, used in the economy of real estate, are six functions of complex interest:

1. Future value of monetary unit – *FV (Future value)*
2. Future value of the annuity – *FVA (Future value of an annuity)*
3. The factor of replenishment of the fund – *SFF (Sinking fund factor)*
4. The current value of the monetary unit – *PV (Present value)*
5. The current value of the annuity – *PVA (Present value of annuity)*
6. Payment for the depreciation of currency – *IAO (Installment of amortize one)*

The future value of the monetary unit investment will help to determine the future value of the monetary unit provided for in the income, based on the time of accumulation and the periodicity of writing with the addition of interest:

$$FV = PV \cdot (1+r)^n$$

here, FV – Future value of monetary unit;

PV – The current value of the annuity;

n – the date of the year, during the time when the fund is realized.

If the quoted formula is done correctly, write adding interest to the label once a year. In cases where the percentage is more than the addition write, the formula will look like this:

$$FV = PV \cdot (1+\frac{r}{m})^{n \cdot m}$$

here, m – frequency of writing by adding interest per year.

From the presented formulas it can be seen that the more percent is written, the more the accumulated sum is. Thus, in practice, the nominal and effective rates of income are allocated. The rate of profit of annual income differs from the annual nominal in that the capitalization of interest (the frequency of writing the addition of interest per year) is taken into account.

In the real estate, as a rule, the use of cash flows is carried out not with one-time payments, but with a series of payments that are made at a certain moment of time, but at different moments of time. If the payments are carried out strictly on a certain interval of time, then such a series is called an annuity.

Annuities are divided into: one norm and one non-norm, simple and advance.

Growth will be a geometric progress if a simple normative annuities are used, therefore, using the famous formula of geometric progress from the course of mathematics:

$$S_n = \frac{b_1 \cdot (q^n - 1)}{q - 1}$$

here, b_1- the first term of geometric progress.
q – the denominator of geometric progress,
you can create a formula for the future value of the annuity.

$$FVA = PMT \frac{(1+r)^n - 1}{r}$$

here, *RMT* – annuity size (one-size-fits-all payment).
When using an advance annuity, the following formula is used:

$$FVA = PMT \cdot \left(\frac{(1+r)^{n+1} - 1}{r} - 1 \right)$$

If annuities are held more than once a year, then, accordingly, there will be an increase in interest. The formula formed above the Bunda comes in the following form:

$$FVA = PMT \cdot \frac{\left(1 + \frac{r}{m}\right)^{n \cdot m} - 1}{\frac{r}{m}}$$

From these formulas it can be seen that the more payments there are, the more the sum accumulation.

The factor of substitution of interest helps to calculate the davriy payment size required for the accumulation of the required amount by the end of the N payment period of a given interest rate.

The future value of the annuity can be summarized from the formula, that is, in the case of a simple annuity, the size of each payment (SFF) is determined as follows:

$$SFF = FVA \cdot \frac{r}{(1+r)^n - 1}$$

In the case of an advance payment (according to the advance annuity), the one-time payment formula looks like this:

$$SFF = FVA \cdot \frac{r}{(1+r)^{n+1} - 1 - r}$$

As can be seen from these formulas, that is, the larger the percentage added in the payment, the greater the size of the payments.

The current value of a monetary unit is the inverse of the monetary unit by the magnitude of the value (in relation to the first function of the compound interest). The current value of the currency is determined from its meaning, that is, it must occur in the future:

$$PV = \frac{FV}{(1+r)^n}$$

In the case of a greater accumulation of percentages, the formula will look like this:

$$PV = \frac{FV}{(1 + \frac{r}{m})^n}$$

As can be seen from the formulas, the larger the discount frequency, the smaller the desired sum of the current value of the monetary unit.

Discussion. The current value of the annuity is equal to the current amount of all payments. by defining the current value of k – payments through PV_k, we generate the current value of a normalized annuity:

$$PVA = \sum_{k=1}^{n} PV_k = PMT \sum_{k=1}^{n} \frac{1}{(1+r)^k}$$

The sum limit is calculated using the formula geometric progress, for the current value of the annuity, the view is drawn:

$$PVA = PMT \cdot \frac{1 - \frac{1}{(1+r)^n}}{r} = \frac{(1+r)^n - 1}{r \cdot (1+r)^n}$$

An analogue for an advance annuity is the current value of an ordinary annuity:

$$PVA = PMT \cdot \left(\frac{(1+r)^{n-1} - 1}{r \cdot (1+r)^{n-1}} + 1 \right)$$

As can be seen from the formulas, the larger the size of the payments, the greater the current sum value.

It helps to determine the size of the periodic payment to close it on the loan within the time period when the amortization payment is made to the monetary unit. Depreciation of the general economic content refers to the process of paying off debt for a certain period of time. When closing a loan with a default payment, the current value is assumed to be equal to the initial amount of the loan. Using the current value formula of the annuity, davriy we will have the size of the payment payment to the amortization capital:

$$IAO = PVA \cdot \frac{r \cdot (1+r)^n}{(1+r)^n - 1}$$

Using analog accounts, it is possible to find the payment size in the amortization directory for the advance annuity:

$$IAO = PVA \cdot \frac{r \cdot \left((1+r)^{n-1} + 1\right)}{(1+r)^{n-1}}$$

Each-a norm payment consists of two parts:

$$IAO = IAO_{np} + IAO_{kp}$$

here, AO_{np} - payment of loan interest;

AO_{kp} - payment of credit.

Conclusion. Thus, in the practice of real estate valuation, the use of financial matechatic functions increases its importance, as well as the effect of making a decision on the investment of real estate.

Investing in real estate is a profitable placement of money, which means not only the preservation of capital, but also the receipt of its profit.

The income-generating investment in real estate is the most profitable. The attractiveness of buying profitable real estate is the return on investment after the payment of operational costs. But in this case, the lower the liquidity of real estate and the methods in which it is entered, the risks are higher than the length of the repayment period of the funds.

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