ESTIMATION OF THE CAPITALIZATION RATE IN REAL ESTATE PROPERTY ANALYSIS AND APPRAISAL

Prof. Ion Anghel Ph. D
The Bucharest University of Economic Studies
Faculty Accounting and Management Information System
Bucharest, Romania
Lect. Raluca Florentina Creţu Ph. D
The Bucharest University of Economic Studies
Faculty Accounting and Management Information System
Bucharest, Romania

Abstract: The appraisal profession and the appraisal process look different than a decade ago. Many changes have come in reaction to problems in property markets others as a result of the development of the knowledge of the real estate appraisal discipline. The real estate crisis creates a debate regarding the quality of the property valuation. One of the most important development was realised in the income approach. The rationale of the income approach is straightforward: the property value is a function of the income expected to produce and the risk behind that income. Where capitalization rate is any percentage use for transforming income into value or the rate of return which convert the annual income from an investment into the value of that investment. We will show below a synthetic presentation of the main methods for calculating the capitalization rate.

JEL classification: M41, M42, O12

Key words: real estate, analysis, estimation, investment, the property valuation

1. INTRODUCTION

The real estate crisis creates a debate regarding the quality of property valuation. One of the most important development was achieved in the income approach. The reasoning of the income approach is straightforward: the property value is a function of the income expected to produce and the risk behind that income. The common formula for the property value is:

$$\text{Value} = \frac{Po}{c}$$

Where:
c: capitalization rate
Po: property operational profit

Any divisor (regularly expressed in percentages) that is used for transforming income into value. The profitability rate used for capitalizing the annual net income, generated by an investment, in order to establish its value at a certain date. The overall

capitalization rate (c) is the ratio between the property operational profit and the selling price:

$$c=\frac{Po}{Pv}$$

Where:
c: capitalization rate
Po: property operational profit
Pv: property selling price

In most cases, assessors find it comfortable to use a single determination modality of the capitalization rate, without knowing, checking or sustaining that rate through other methods.

Given the requirement of the assessor testing it during the evaluation process, we will show below a synthetic presentation of the main methods for calculating the capitalization rate.

2. OBJECTIVES

The present study is aiming both for establishing the capitalizing rate under various conditions provided by the market and also for showing the investor's expectations. Scenarios will be analyzed starting from the assumption that the assessor knows the operational profit and the property selling price, the typical expense rate, the gross rent for calculating the profitability rate of the operational income, the operational income, the multiplier of the operational income, the interest rate and the reimbursement date, the physical features of the real estate property such as land and buildings, the elements that influence the updating factor, etc.

3. METHODOLOGY

In order to reach the above mentioned goals, we suggest to use the following investigation methods: the direct comparison method, the build up method, the underwriter method, other methods based on capital cost (such as "band of investment"), Elwood method, establishing capitalizing rate based on Akerson model.

4. ANALYSES

4.1.The direct comparison method

$$c=\frac{Po}{Pv} \quad (1)$$

Where:
c: capitalizing rate;
Po: property operational profit
Pv: property selling price
This is the general, universal formula for calculating the capitalizing rate starting from the assumption that the assessor knows the operational profit (Po) and the property selling price (Pv).

The capitalizing rate resulting from this formula comprises implicitly the assumptions regarding the investor's expectations in that particular selling-purchasing operation.

The formula proves itself to be relevant when the characteristics of the sold properties (taken as comparison premises) are similar to the ones of the assessed property, primarily by:

- ✓ Location of the property
- ✓ Land occupancy rate
- ✓ Expenses rate
- ✓ Property occupancy rate
- ✓ Buyer's motivation and risk levels

Also, given the fluidity of any market (therefore also the one of the real estate market), transactions considered by the assessor for comparable properties must be recent in order to be able to reflect the actual conditions existing on the market. Once the capitalizing rate has been established and it is used for comparable properties and as long as this derives from the market, then it proves itself extremely convincing.

Starting from ratio (1), we can conclude that there is another way of establishing the capitalizing rate considering the following formulas:

$$RVo = \frac{Po}{Vo} \quad \text{(a)}$$

$$MVo = \frac{Pv}{Vo} \quad \text{(b)}$$

Where:
RRVo: profitability rate of the operational income
Vo: operational income
MVo: multiplier of the operational income
Given these conditions, the result is:

$$Po = RVo x Vo \quad \text{(a')}$$
$$Pv = MVo\, x Vo \quad \text{(b')}$$

Starting from ratio (1) and the (a') and (b') formulas, the result is:

$$R = \frac{RVo x Vo}{MVo x Vo} = \frac{RVo}{MVo} \quad \text{(c)}$$

Given these conditions, we can note another way of expressing the capitalizing rate through the direct comparison method and that is:

$$R = \frac{RVo}{MVo} \quad \text{(1')}$$

Assessors are aware of the fact that there are only two types of direct capitalization:

- ✓ Dividing income (profit) to an established capitalizing rate
- ✓ Multiplying income (profit) by a capitalizing factor (multiplex)

Given the second approach, operational income (Vo, either potential or real) can stand as base for applying the multiplex. This approach is generally used for the method of market comparison and it is not considered as a method that requires capitalization.

However, the two parts of the formula can be relatively simple to infer from the information of the market:

Multiplex of the operational income (MVo)

Profitability of the operational incomes (RVo), directly influenced by the level of the expense rate.

As an example, a simple market research might indicate the level of the gross rent for similar properties on the moment of valuation. The multiplier of the operational income (MVo) can be calculated by diving the selling price (Pv) with the operational income (Vo), this way establishing the indicator required by the denominator of ratio (1').

Market analyses can equally give us information regarding the specific expense rate, based on which we can also establish the profitability rate of income (RVo):

RVo = 100% - expense rate

Knowing these two numbers (RVo and MVo), it is easy to calculate the capitalizing rate as per ratio (1').

Scenario: One year after being sold, a property sold for 350,000 RON has a potential of gross operational income amounting to 70,000 RON. The non-occupancy losses amount to 4%, while the expense rate amounts to 39% of the actual gross income (VBE). The requirement is to establish the capitalizing rate.

The answer is shown under Table no.1:

Table no. 1 - Indicators

Indicator	Value
Potential gross income (VBP)	70.000
Non-occupancy loss (4%)	2. 800
Actual gross income (VBE)	67.200
Expenses (39%)	26.208
Operational profit	40.992

Source: Own calculations

$$c = \frac{Po}{Pv} = \frac{40.992}{350.000} = 0,11712 \quad or \; 11,712 \, \%$$

Analyses: If the 350,000 RON selling price has not been paid in cash, then the capitalizing rate is incorrect; also, if the operational profit of 40,992 RON is not correct, then the calculated capitalizing rate is not consistent either.

Information from such researches are useful for assessors due to the fact that they reflect a certain situation of the market (competitive offer, demand-offer ratio, etc) and equally highlight a certain dissipation of the capitalizing rate.

When capitalizing rate cannot be directly extracted due to the lack of sufficient comparable sales or when it is useful to make the annual cash rates of return to lenders and equity investors, the explicit capitalization rate can be estimated using other methods such as the build up method or the band of investment method.

4.2. The build up method

$$c = Rf + Rl + Rm + \text{Re} \quad (2)$$

This is one of the oldest methods of calculating the capitalizing rate and it consists of a step by step build up starting from the profitability rate (capital remuneration) free of risk - Rf., to which you add the following:

- ✓ Liquidity risk (Rl)
- ✓ Management risk (Rm)

Economic risk (Re), that is the risk of changes in the economic conditions.

Obviously, the estimation of factors involved in this model is based on the assessor's partial judgement and on the fact that there is always a possibility for conflicts of different opinions to occur. However, this method of calculating the capitalizing rate is extremely useful for the comparative reasoning when several methods of determining the "c" capitalizing rate are used.

4.3. The underwriter's method

$$R = RAD \, x \, RCV \, x \, Rd \quad (3)$$

Commonly known as the underwriter's method, this formula is especially used by sponsors of real estate properties; these sponsors start from their own requirements related to:

- ✓ Debt defrayment margin (RAD), that is the ratio between profit before tax and interests and debt;
- ✓ The ratio between the loan volume and the property value (RCV - Loan-value ratio)
- ✓ Interest rate (Rd).

In this case too, the method proves itself relevant only when it is based on the market. All assessors should check what the conditions are for the availability on the market of the loan on mortgage for the respective type of property and they should know what the requirements of mortgage lenders are. This is entirely based on the assumption that any lender sets the control for the portfolio of financed properties by sizing the risk that he has undertaken (that is the risk controlled by the loan-property value ratio, RCV), the interest rate to pay and the reimbursing date.

If the assumptions regarding the three variables in the formula come from a certain lender and not from the market, the capitalizing rate will rather reflect the value for the lender more than the market value.

Scenario: A different market analysis shows that the debt defrayment margin (RAD) is 1.35 when the time period does not exceed ten years; the loan-value rate (RCV) amounts to 0.7 or 70% and the interest rate is 12%.

Solution:

$$c = RAD \, x \, RCV \, x \, Rd$$
$$c = 1,35 \, x \, 0,7 \, x \, 0,12 = 0,1134 \; or \; 11,34\%$$

Analysis: When using Elwood formula, assessors should check the capitalizing rate calculated by starting to check the debt defrayment margin (RAD).

$$RAD = \frac{c}{RCV \, x \, Rd} \quad (3')$$

If the interest defrayment margin thus calculated is inconsistent, far from the lenders' criteria for similar properties, the capitalizing rate calculated by Elwood method

(or any other similar method) shows some incongruity which requires that the initial assumptions should be revised.

4.4. Methods based on the capital cost (the "band of investment" type)

General approach

The use of the balanced average of the returns to the lender and the equity investors to estimate capitalization rate dates back to at least 1944 in the appraisal literature[1]. Also known as the "band of investment method", this approach is based on the assumption that the capitalizing rate depends on the balanced average cost of the total capital (debts and owned capital), the quality of the investment risk assumed for that particular property. Equally referred to as the analysis of the capital in pawn, the formula shows that the capitalizing rate is a balanced average of the interest rate of the mortgage - Rd and of the profitability rate of the owned capital - RKpr.

$$c = RCV \, x \, Rd + (1 - RCV) RKpr \quad (4)$$

The rate built in such a way satisfies both the lender's on mortgage requirements, as well as the ones of the participants to the owned capital (the shareholders). This represents a very popular method amongst assessors, but most often it is based on information coming from the lenders' and shareholders' "inspectors" and not directly from the market.

Scenario: The analysis of the local market demonstrates that property can be financed under the following loaning conditions:

The loan/value ratio (RCV) : 70% or 0,7;

A fixed interest rate (Rd): 14%;

Another study shows that the investor's expectancy (from similar properties) amounts to 12% profitability rate.

Solution: The capitalizing rate will develop based on ratio (4)

$$c = 0,7 \, x \, 0,14 \, x + 0,3 \, x \, 0,12 = 0,1340 \, sau \, 13,4\%$$

The approach based on the physical features of the real estate property,

$$c = T \, x \, c_t + (1 - T) \, x \, c_c \quad (5)$$

This approach represents another "band of investment" type of technique which starts from the relation between the physical components of the real estate property: the land and the buildings. The ratio between the value of the land and the value of the property (T), respectively the one between the value of the buildings and the value of the property (1-T) is well known by the assessor, same way as the capitalizing rate for each of the two components of the real estate property (c_t - the capitalizing rate for the land, c_c respectively - the capitalizing rate for buildings) can be inferred from the market.

Scenario: A real estate property was sold for 150,000 USD; during the first year, the operational profit (Po) amounted to 15,750 USD. The estimated value of the land amounted to 30,000 USD. If the capitalizing rate of the land is of 9%, how much is the capitalizing rate of the building?

---

[1] **Kazdin E. Capitalization under Present Market Conditions, The Appraisal Journal, Oct.1944**

Solution:

Step 1: Calculation of the operational profit generated by the land (Po_t)

$$c_t = \frac{Po_t}{Pv_t} \text{ , therefore } \quad Po_t = c_t \text{ x } Pv_t$$

$$Po_t = 0{,}09 \text{ x } 30.000 = 2.700 \text{ \$}$$

Step 2: Calculation of the operational profit generated by the building (Po_c)

$$Po = Po_t + Po_c \text{ , therefore } Po_c = Po - Po_t = 15.750 - 2.700 = 13.050 \text{ \$}$$

Step 3: Calculation of the estimated value of the building (V_c)

$$V = V_t + V_c \text{ , therefore } V_c = V - V_t = 150.000 - 30.000 = 120.000 \text{ \$}$$

Step 4: Calculation of the capitalizing rate of the building (c_c)

$$V_c = \frac{Po_c}{c_c} \text{ , therefore } \quad c_c = \frac{Poc}{V_c} = \frac{13.050}{120.000} = 10{,}88 \text{ \%}$$

Where:
C_t = capitalizing rate for the land
Po = operational profit generated by the real estate property
Po_t = operational profit generated by the land
Po_c = operational profit generated by the building
Pv_t = selling price of the land
V = value of the real estate property
V_t = value of the land
V_c = value of the building

Analysis: This represents an useful approach especially in case of the "best application" when the value of the building is known (or can be reasonably estimated), and the question points in the direction of the most profitable exploitation that can be given to the land.

The approach based on the profit rate:
$$R=Y \quad (6)$$

Y = profit rate

When the assessor expects that the profit and the value of the property remain unchanged for a long period of time, the property is valued by capitalization over an unlimited period of time and in such case the rate is similar to the profit rate (Y).

When the assessor foresees an upcoming change in the profit/value of the property, the above formula is to be adjusted taking into account the following two factors:

Δ - change in the value of the property

α - corresponding updating factor

The calculation of the capitalizing rate will be done based on the following ratio:

$$R = Y - \Delta\alpha \quad (6.1.)$$

The assessor must take into account the following ratio: he must consider three variables for establishing the updating factor:

The assessor's perception towards an envisaged change;

Dimension of the profit/value flow of the property;

The upcoming period of time when the change will take place.

When it is expected that the income will stay at the same level, but the value of the property will change during the upcoming period of time, R will be adjusted as per the below ratio:

$$R = Y - \Delta\frac{1}{Sn} \quad (6.2.)$$

Where:

1/ Sn = the sinking fund factor

If conclusions point in the direction of both profit and the value of the property changing linearly over a given period of time, the correction will multiply by 1/n ratio (where "n" stands for the number of forecast years), as per the below 6.3 ratio.

$$R = Y - \Delta\frac{1}{n} \quad (6.3.)$$

In case of income/value changing at a constant rate, the capitalizing rate (R) will be calculated as the difference between the profitability rate or income rate (Y) and the changing rate (RM). If the investor's expectation amounts to 12% profitability level and the annual increasing rate of income and value is of +2%, it is obvious that the capitalizing rate will be of 10% (12% - 2%).

$$R = Y - RM \quad (6.4.)$$

4.5. Elwood method

$$R = \frac{Ye - RCV(Ye + P\dfrac{1}{Sn} - Rd) - \Delta\dfrac{1}{Sn}}{(1 + \Delta, J) \, or \, K} \quad (7.1.)$$

Where:

Ye - profitability (income) rate associated to the capital invested in a property;

α - corresponding updating factor.

Many experienced assessors will recognize Elwood formula in the (7.1) ratio, from where it derives the capitalizing rate incorporated in the capital structure (owned and borrowed). Developed by L.W. Elwood and re-defined by C.B. Akerson this is the algebra equivalent of the analysis of the liquid assets updated flow (discounted cash - flow - DCF).

Akerson's formula is the following:

$$R = (RCV \times Rd) + (1 - RCV) Ye - RCV \times P \times \frac{1}{Sn} - \Delta \times \frac{1}{Sn}$$ (7.2.)

Akerson's approach presents the advantage that it allows the easy comprehension and the step by step development of the technique for calculating the capitalizing rate.

Table no. 2 Calculation of the capitalizing rate based on the Akerson model

Step 1	Establishing the balanced average cost of capital Credit/value ratio x Interest rate (RCV x Rd) + heaviness of the owned capital x Profitability of the owned capital (1-RCV) x Ye	Balanced average
Step 2	Adjustment for increasing the owned capital (-) Credit/value ratio x Paid share and loan (RCV x P) x Sinking fund factor (1/ Sn)	Basic rate
Step 3	Adjustment for appreciation and depreciation (-) +/- Sinking fund factor (1/ Sn)	Capitalizing rate

Source: Own calculations

The first step is similar to any calculation of the balanced average cost of capital.

The second step adjusts the average cost of the total capital for increasing the shareholders' capital as the investor pays off the loan, this adjustment resulting into a basic rate.

The third step corrects the basic rate for any appreciation/depreciation foreseen by the assessor for the upcoming period of time, thus establishing the capitalizing rate.

Elwood's initial formula has been developed only for one level of the income flow, but later they have considered fluctuations of the various income sources anticipated by the assessor.

Scenario: Capitalizing rate to be calculated given the following known information:

- ✓ Loan/value ratio RCV: 70% or 0.7;
- ✓ Fixed interest rate Rd: 11.5%;
- ✓ Debt defrayment margin RAD: 1.25;
- ✓ Profitability rate of the owned capital: 14%
- ✓ In the coming ten years, a 50% appreciation rate is expected for the

respective category of property (annual appreciation 4.14%).

The solution is shown under table no. 3:

Table no. 3 Calculation of the capitalizing rate based on the Akerson model

Step 1	Calculation of the balanced average cost of capital 70% mortgage x 0,115 constant mortgage= 0,08106 30% owned capital x 0,14 expected profitability= 0,04200	0,1225 Balanced average
Step 2	Adjustment for increasing the owned capital (-)70% mortgage x 0,26976 (share of reimbursed loan) x 0,05171 (sinking fund factor) = 0,00976	0,11274 Basic rate
Step 3	Appreciation/Depreciation adjustment (-) 50% appreciation x 0,05171 (Sinking Fund Factor) = 0,025855	0,086885 or 8,69% Capitalizing rate

Source: Own calculations

5. CONCLUSIONS

The capitalizing rate represents the ratio between profit and value and it is a divisor that changes the lending income into an indicator of the market value for a certain real estate property.

This rate is influenced by several factors such as the risk level, the behaviour of the market towards the future evolution of the inflation, the fructification rates of the invested capital expected for alternative investments, the profitability previously realized by similar properties, the demand and offer of cash and capital, the taxpaying levels, etc.

The capitalizing rate implicitly comprises the assumptions regarding the investor's expectations from the selling-purchasing operations.

Whatever the method for calculating the capitalizing rate might be, whatever the factors that influence it might look like, this must be correlated with the market at all times.

Given the fluidity of any market (therefore also the one of the real estate market), the transactions considered by the assessor for comparable properties must be recent in order to be able to reflect the actual conditions existing on the market.

Once the capitalizing rate has been calculated and put into practice for comparable properties and as long as it derives from the market, then this proves itself extremely convincing.

REFERENCES

1. Hanford, L.   The Capitalization Process Revisited, The Appraisal Journal, 1976
2. Kazdin, E.   Capitalization under Present Market Conditions, The Appraisal Journal, Oct.1944
3. Lusht, K.   Real Estate Valuation. Principles and Applications, KML Publishing, 2001