Equation[i] of Real Estate Value Estimation

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Abstract   The article deals with evaluation of commercial properties. Using the basic formula of the income approach to valuation of assets, we developed the equation of real estate value estimation, which in the process of calculating the value of the property allows us to explicitly show the pricing mechanism for the seller and the buyer of the finished commercial property. It is shown that the proposed approach has certain versatility, as it helps to evaluate both vacant and partially or totally built-up land.

Keywords   Value, Estimation, Real estate, Property, Investment, Income approach to value, Real property valuation, Market and investment value, Equation of value estimation, Cash flows, Capitalization, Discounting, Investor, Buyer, Seller, Appraiser, Profit of entrepreneurs, Land valuation, Land improvements valuation, Value to a buyer, Value to a seller

Many things we do not understand, not because our notions of weak, but because these things are not included in the circle of our concepts

Kozma Prutkov

1. Introduction

Real estate appraisal as a tool for measuring the value of the real estate property is a process involving the property market simulation by using different approaches. The use of the market approach implies creating a model of the market for comparable properties, whereas under the income approach to value the appraiser essentially simulates the behavior of a typical investor who uses cash on his own account to create or acquire an investment property [ii], and in the process of this simulation determines the value of the property.

Income approach to value an income-producing real property can be defined as a set of methods for evaluating investment properties based on capitalization of current or potential incomes. In this case, the current income will mean income, which a valued object generates at the valuation date, and a potential income − income that can be generated by a valued object in the future.

There is [1-4] the direct capitalization method, the yield capitalization method and method of capitalization with the help of income and property models.

The direct capitalization method is based on the capitalization of income using the current yield (overall cap rate), pulled from the market for similar properties by analyzing their yields of current income, which the investment property generates. This method is usually used to evaluate smaller commercial properties, which is widely represented in the market.

The yield capitalization method is based on the capitalization of future potential flow of income which an estimated property is capable to generate over the forecast period, including proceeds from the resale of the property at the end of the forecast period. In this case for the capitalization of income as the discount rate the yield rate (yield to maturity) is used, determined on the basis of the analysis of the cost of alternative investments.

The method of capitalization with the help of income and property models is based on the capitalization of potential income that the estimated property is able to generate, using previously designed models of income and value obtained with certain assumptions about the nature of their change in the forecast period.

In terms of evaluation, it should be noted that the base method of the income approach is the yield capitalization method. Direct capitalization method and the method of capitalization with the help of income and property models can be seen as variants of the base method, which are used to value income producing property only under certain assumptions about the nature of changes in income and value.

For example, direct capitalization method is fair to value existing commercial real estate, the use of which is the highest and best use, and the state of these properties does not require substantial investments in their repair or reconstruction. The method of capitalization with the help of

income and property models may be used to estimate the value of the investment property, income dynamics of which allows the use of a pre-generated math model of capitalizing such income. A typical example is a property that can indefinitely generate a steady unlimited stream of income. To estimate the value of such an object, you can use income model, which represents the quotient of the net income and the rate of return on capital or discount rates.

The yield capitalization method (method of capitalization at a rate of return on capital) needs no special assumptions for their use and can be applied to estimate the value of the investment property at any stage of its readiness – from vacant land to the finished commercial real estate property. As a rule, this method is used to measure the value of objects whose construction or type of use you want to modify. These include new building projects, providing land development, or existing real estate objects, which need to be reconstructed. According to the classification given in [1], such objects are referred to as potential properties. The method is also applicable for evaluation of commercial real estate objects requiring redevelopment, fitting-out, or for evaluation of a major mixed-use projects. According to [1] such objects are commonly referred to as distressed properties.

Taking into account the above mentioned, the method of capitalization at a rate of return on capital can be defined as a universal method for the evaluation of commercial or likely to be such objects. For example, you can use it to evaluate the land on which there is only a destroyed or a newly built basement. Such objects can be defined as unfinished real estate property or, briefly, unfinished property.

The formula, which implements the method of capitalization at a rate of return on capital in the most general form, can be written as follows:

$$V_{t_0} = -E_{t_0} - \frac{E_{t_1}}{(1+Y)^{t_1-t_o}} - ... - \frac{E_{t_r}}{(1+Y)^{t_r-t_o}} +$$
$$\frac{I_{t_{r+1}}}{(1+Y)^{t_{r+1}-t_o}} + \frac{I_{t_{r+2}}}{(1+Y)^{t_{r+2}-t_o}} + ... + \frac{I_{t_n}+V_{t_n}}{(1+Y)^{t_n-t_o}} \qquad (1)$$

Here V_{t_0} – the property search value indication; t_0 – valuation date or starting time of the process of creating the property; $t_1, t_2 ... , t_n$ – timing of investments or incomes; $E_{t_0}, E_{t_1}, ... , E_{t_r}$ – investments in constructing a new building on vacant land or reconstructing of existing land improvements (an old building on the land); r – the number of periods of construction or reconstruction; n – the total number of forecast periods ($n>r$); $I_{t_{r+1}}, I_{t_{r+2}}, ... , I_{t_n}$ – net operating income at the appropriate time; V_{t_n} – revenue from the sale of a facility investments at the end of the last period; Y – rate of return on capital (discount rate).

Note that such record of the discounting formula gives us the ability to assign different duration periods for the various stages of the project. For example, at the initial stage of the

creation or renovation of the property the duration period can be defined as the period of the quarter, and at the stage of the operation of the created object property – a year.

For the convenience of working with formulas we assume that the starting time is zero: $t_0=0$, and for convenience, we omit the time index «t» in equation (1).

So the formula (1) can be rewritten as follows:

$$V_0 = -E_0 - \frac{E_t}{(1+Y)^1} - ... - \frac{E_r}{(1+Y)^r} +$$
$$\frac{I_{r+1}}{(1+Y)^{r+1}} + \frac{I_{r+2}}{(1+Y)^{r+2}} + ... + \frac{I_n+V_n}{(1+Y)^n}. \qquad (2)$$

Note that the choice of the discount rate as a single value for the entire project is only one of the known approaches to discounting the cash flow generated by the investment project at different stages of its implementation. With this approach, the discount rate is calculated by analyzing the internal rates of return of investment projects, comparable to the estimated one [5]. Another approach is based on the fact that the different stages of the investment project are characterized by different risks. And, in this regard, it is recommended (see e.g. [7]), for different stages of the project, to take the following discount rates: higher rates – for stages of construction or reconstruction and lower rates – for the stage of completion of investment in lease. In our view, such an approach is possible, but to use it you must first solve far from a simple task – to support the different rates for different stages of the investment project. The task of choosing the discount rate to estimate the market value refers to the most complex tasks of real estate valuation under the income approach. And if you need some of these rates, the problem of their choice, in our opinion, is complicated by multiple ways.

In this article we will choose first a simple but well known approach to discounting, discounting by single value rate equivalent to internal rate of return of the project. Also note that, in our view, the uses of different discount rates are more appropriate in the analysis of investment projects. In these cases discount rates can be guided by the wishes of the investor on the profitability of the various stages of the investment project.

The formula (1) or (2) is a formula of discounting cash flows. It can be defined as the basic formula to calculate the efficiency of investment, recommended for the use of the UN and the World Bank, and for real estate appraisal using income approach [1, pg. 634]. The technique of discounting cash flows, in our view, should not be seen as a variation of the income approach, since it is just a tool for calculating the present value of the income stream, which analysts use to measure positive and negative cash flows (revenues and expenses) at different points in time.

If you perform some transformation of the formula (2), you can get a useful interpretation of concepts, such as the equation of evaluation, absolute and relative entrepreneurial profit, and entrepreneurial profit in annual figures, the value

to the seller and value to the buyer.

Let's start with the equation of evaluation.

2. Equation of Real Estate Value Estimation

Multiply the left and right part (2) by $(1+Y)^r$:

$$V_0(1+Y)^r = -E_0(1+Y)^r - E_1(1+Y)^{r-1} - ... - E_r +$$
$$\frac{I_{r+1}}{(1+Y)^1} + \frac{I_{r+2}}{(1+Y)^2} + ... + \frac{I_n + V_n}{(1+Y)^{n-r}}.$$

The amount of accumulated costs will move to the left side of:

$$V_0(1+Y)^r + E_0(1+Y)^r + E_1(1+Y)^{r-1} + ... + E_r$$
$$= \frac{I_{r+1}}{(1+Y)^1} + \frac{I_{r+2}}{(1+Y)^2} + ... + \frac{I_n + V_n}{(1+Y)^{n-r}}. \quad (3)$$

Note that the left-hand side of equation (3) is an accumulated by the time r sum of investment of the investor. The structure of this investment includes the purchase costs of the investment property, which can be regarded as a vacant land or unfinished property. This amount can be considered as a cost price of a created object of investment when assessing the value of the land or the cost price of completed investment in evaluating unfinished property, that is, in fact, the value of built property to the seller:

$$V_r^S = (V_0 + E_0)(1+Y)^r + E_1(1+Y)^{r-1}$$
$$+ E_2(1+Y)^{r-2} + ... + E_r \quad (4)$$

Here, S means the Seller.

The right side of equation (3) is the discounted value of the investment property, which can be considered as a value of the finished object of investments at the same time r, received by income approach, or the value of ready property to the buyer (investor):

$$V_r^B = \frac{I_{r+1}}{(1+Y)^1} + \frac{I_{r+2}}{(1+Y)^2} + ... + \frac{I_n + V_n}{(1+Y)^{n-r}}. \quad (5)$$

Here, B means the Buyer.

In General, the equation (3), first presented in [6], could be described as the equation of value estimation, equalizing supply and demand prices, or the price to the seller and the price to the buyer for the finished object of investment in real estate. Equation (3) can be defined as a kind of "deal" equation, in which the buyer and seller agree on a price, which suit both sides.

Close, in fact, technology of appraising a market value of the investment property is presented in the monograph [7, p. 206], with the difference that respected author recommends for accumulating costs and discounting income the use of different rates of interest. The author [7] identifies such approach to this evaluation as a mixed (profitably-cost) approach. In our view, the use of different yield rates into a single investment project is controversial. But this is not important. Importantly, as shown above, the equation (3), at the same or different interest rates, is only a consequence of the basic formula of the income approach (2), and to determine the approach as a mixed (profitably-cost), in our opinion, is erroneous.

3. Entrepreneurial Profit (*incentive*)

Equation (4) can be represented as follows:

$$V_r^S = V_0 + E_0 + E_1 + E_2 + ... + E_r +$$
$$+ (V_0 + E_0)\left[(1+Y)^r - 1\right] + E_1\left[(1+Y)^{r-1} - 1\right]$$
$$+ E_2\left[(1+Y)^{r-2} - 1\right] + ... + E_{r-1}Y.$$

We denote the sum $(V_0 + E_0 + E_1 + E_2 + ... + E_r)$ via $\sum E$:

$$\sum E = V_0 + E_0 + E_1 + E_2 + ... + E_r, \quad (6)$$

and define it as a *direct sum of investments*. This amount represents a simple (without taking into account the time value of money) amount of the cost of acquisition of the vacant or built-up land and associated costs for the construction or renovation.

The remainder can be characterized as entrepreneurial profit for the period r:

The remainder can be characterized as entrepreneurial profit or entrepreneurial incentive[iii] for the period r:

$$\Delta V_{P_r} = (V_0 + E_0)\left[(1+Y)^r - 1\right] + E_1\left[(1+Y)^{r-1} - 1\right]$$
$$+ E_2\left[(1+Y)^{r-2} - 1\right] + ... + E_{r-1}Y \quad (7)$$

The profit or incentive depends on Y describing the acceptable yield to the investor as compensation for the risk of investing in the project. The more risk, the higher the return will the investor want.

The approach, founded on this method of calculating the entrepreneur's earnings, is based on the concept of imputed costs. There are many definitions of imputed costs, but they are somehow reduced to the fact that the opportunity costs should be understood as a lost income over a certain period of time which the investor could have received if his investment during this time could generate income.

In our case, during the period of creation or renovation of real estate, the capital invested in the purchase of land and construction or reconstruction of improvements "does not work" as a source of profit and therefore does not generate a profit. The investor includes this loss of the profit in the price of the object being created.

Note that this approach to the calculation of entrepreneur profit provides that its absolute value depends on the amount of investment, the rate of return on capital and on the time

during which capital is idle. It is important that the amount of investment, the rate of return on capital and on the time during which capital is idle should be consistent with market indicators.

In order to make an entrepreneur profit as a fraction of the total volume of investment it is necessary to divide it by the direct sum of investments:

$$\delta V_{P_{t_r}} = \frac{\begin{array}{c}\left(V_0 + E_0\right)\left[\left(1+Y\right)^r - 1\right] + E_1\left[\left(1+Y\right)^{r-1} - 1\right] \\ + E_2\left[\left(1+Y\right)^{r-2} - 1\right] + ... + E_{r-1}Y\end{array}}{V_0 + E_0 + E_1 + E_2 + ... + E_r}.$$

(8)

Note that the formula (8) specifies the relative profits of an entrepreneur in the period of construction or reconstruction. To analyze the profitability of investment projects the relative entrepreneur profit on an annual basis is more often used:

$$\delta V_P = \left(1 + \delta V_{P_r}\right)^{1/r} - 1.$$

The value (5) of the built real estate object to the buyer also depends on the rate of return on capital, but in another way – the higher the risk, the less money the buyer has to invest in the acquisition of the built object, as the discount rate is proportional to the risk, and it is in the denominator of the formula (5), which determines the present value of future income.

The seller and buyer are interested in the higher rate of return on equity, because the seller can thus expect higher profits and purchasers – to get the built object of investments at a lower price and faster return on their investment.

But no matter how much buyers and sellers would like to have a higher rate of return, it cannot be higher than the maximum possible rate of return which exists on the markets for similar projects.

In order to trace the mechanism of the value formation during the process of estimation using the proposed approach, let us consider the technology of market value estimation of the improved (built-up) land.

To demonstrate the capabilities of the approach we will perform this estimation consistently in two stages: first, we estimate the value of the land as vacant (without improvements), and then estimate the land improvements value. And the total value of a built-up land will be defined as the sum of values obtained at each of the stages. For clarity, we will accompany this technology with the simplified examples for each stage.

4. Valuation of a Vacant Land

If the object of investments is a vacant land, in this case we should consider as investments the costs to acquire this land and the costs to create the appropriate improvements of

the land, depending on the calculated value (market or investment value).

The direct sum of investments should be calculated as follows:

$$\sum E = V_{L_0} + E_0 + E_1 + E_2 + ... + E_r.$$ (9)

Here V_{L_0} – the desired value of vacant land on the date of estimation, $E_0, ..., E_r$ – cost of building land improvements, for example, the construction of the building.

Note that as the cost of building land improvements $E_0, ..., E_r$ in the formula (9) you must consider not only the cost of constructing the buildings, but also all the costs of setting up utilities water, electricity and lighting, as well as the drainage system excreta.

Entrepreneur profit for the period r is equal:

$$\Delta V_{P_r} = \left(V_{L0} + E_0\right)\left[\left(1+Y\right)^r - 1\right] + E_1\left[\left(1+Y\right)^{r-1} - 1\right]$$
$$+ E_2\left[\left(1+Y\right)^{r-2} - 1\right] + ... + E_{r-1}Y$$

(10)

In general, taking into account entrepreneur profit, the built investment property value to the seller can be written as the sum of the following:

$$V_r^S = \sum E + \Delta V_{P_r}.$$ (11)

At the chosen rate of return on capital Y and calculated costs E, in equation (11), the land value V_{L0} is unknown at the date of valuation.

The right side of the equation (3) formally looks the same for any asset being valued. It is a formula to calculate the present value of the income stream generated by a built investment property. Note that this value depends on the value formed by the left part of the equation (3), of value estimation, of system of taxation, depreciation and dynamics of the resale price of the asset created.

Example 1 (evaluation of the land as vacant). During the analysis of the highest and best use of the land as vacant the appraiser has concluded that it is advisable to build the Office Center for rent on the estimated area of land.

Table 1 shows the parameters for the calculation of the value to the seller, while table 2 – the results of this valuation made by the formula (11) corresponding to the data.

Table 3 presents the initial data for the calculation of the value to the buyer, while table 4 – the results of this valuation obtained from equation (5).

The difference between the values to the seller and the buyer:

$$V_r^S - V_r^B = 40\ 292\ 471 - 39\ 381\ 159 = 911\ 313\ (CU).$$

This difference is eliminated by the method of successive approximations by selection of the desired value of the land as vacant.

The results obtained through this task by using the Excel built-in function "goal seek" are the following: desired value of the land as a vacant $V_{L0} = 7868085$ CU; the value of the constructed property $V_r^S = V_r^B = 39024726$ CU.

Table 1. The parameters for the calculation of the value to the seller

During the construction period, quarter	*4 (1 year)*
Construction costs at the beginning of the first period, E_0	*14 000 000 CU*
Construction costs at the beginning of the first period, E_1	*10 000 000 CU*
Construction costs at the beginning of the first period, E_2	*2 000 000 CU*
Construction costs at the beginning of the first period, E_3	*1 000 000 CU*
Construction costs at the beginning of the first period, E_4	*500 000 CU*
Rate of return on capital, Y (discount rate)	*12%*
The initial value of the land appraisal as vacant, V_{L0}	**9 000 000 CU**

Table 2. The results of calculation of the value to the seller

Time, i *(in fractions of a year from the date of the evaluation)*	*Costs,* E_i	*Factor* *for accumulation* $(1+Y)^i$	*Costs, accumulated by the end of the construction period,* $E_i(1+Y)^i$
0,00	*23000000*	*1,120*	*25760000*
0,25	*10000000*	*1,089*	*10887133*
0,50	*2000000*	*1,058*	*2116601*
0,75	*1000000*	*1,029*	*1028737*
1,00	*500000*	*1,000*	*500000*
		Total present worth $V_r^S =$	*40 292 471*
	Profits entrepreneur		*3 792 471*
	Profits entrepreneur %		*9,41%*

Table 3. Initial data for calculating the value to the buyer

1st year effective gross income	*10000000*	*Operating expenses*	*30%*
2nd year effective gross income	*13000000*	*Period of economic life, years*	*10*
3rd year effective gross income	*13000000*	*Depreciation[iv]*	*linear*
4th year effective gross income	*11000000*	*Real estate tax rate (TR), % of taxable (market) value*	*2%*
5th year effective gross income	*8000000*	*Depreciation at date of sale*	*40%*

Table 4. The results of calculation of the value to the buyer

	Year number				
	1	*2*	*3*	*4*	*5*
Effective Gross Income	*10000000*	*13000000*	*13000000*	*11000000*	*8000000*
Operating expenses	*-3000000*	*-3900000*	*-3900000*	*-3300000*	*-2400000*
Taxable value (TV)	*40292471*	*36263224*	*32233977*	*28204730*	*24175483*
Real estate tax (TV× TR)	*-805849*	*-725264*	*-644680*	*-564095*	*-483510*
Net resale proceeds					*24175483*
Total net income	*6194151*	*8374736*	*8455320*	*7135905*	*29291973*
Discount factor	*0,89*	*0,80*	*0,71*	*0,64*	*0,57*
Present value	*5530492*	*6676288*	*6018330*	*4534997*	*16621052*
Total present worth V_r^B	**39381159**				

Note that in this example we used a single discount rate for the entire project. However, the proposed approach allows you to evaluate the investment value of the land using different discount rates. For this it is necessary to carry out their choice, for example, focusing on the requirements of the investor on the payback period for different stages of the investment project, and use them in calculations in formulas (5) and (11).

5. Evaluation of Land Improvements

If the object of investment is the improved land, but requiring repair or reconstruction, the entrepreneur profits will look like this:

$$\Delta V_{P_r} = \left(V_{L0} + V_{B0} + E_0\right)\left[\left(1+Y\right)^r - 1\right] +$$
$$E_1\left[\left(1+Y\right)^{r-1} - 1\right] + E_2\left[\left(1+Y\right)^{r-2} - 1\right] + ... + E_{r-1}Y \quad . (12)$$

Here V_{B0} is the cost to acquire the existing land improvements, which are also on the reconstruction period in the "frozen" state and therefore do not generate revenues.

Thus the cost of improvements reconstructed by the time r is given by the following sum:

$$V_{Br} = V_{B0} + \Delta V_{P_r}, \quad (13)$$

here entrepreneur profit ΔV_{P_r} is calculated according to the formula (12).

In general, taking into account entrepreneur profit, the reconstructed investment property value to the seller can be written as the sum of the following:

$$V_r^S = \sum E + \Delta V_{P_r}, \quad (14)$$

where direct sum of investments $\sum E$ is equal to

$$\sum E = V_{L0} + V_{B0} + E_0 + E_1 + E_2 + ... + E_r. \quad (15)$$

Note that the formula (15) differs from the formula (9) by having therein the value of land improvements V_{B0}.

So, let us consider a simplified example of the estimates technique of the market value of land improvements, corresponding to the equation (3), assuming that the value of the vacant land is already known to us from the section "Valuation of vacant land»"[v].

Example 2 (evaluation of land improvements)**.** In the process of analyzing the most efficient land use the appraiser has concluded that the estimated built-up land is necessary to reconstruct, unlike example 1, into the trading center for the subsequent renting it out.

Table 5 shows the parameters for the calculation of the value to the seller, while table 6 – the results of this valuation made by the formula (14) corresponding to the data.

Table 7 presents the initial data for the calculation of the value to the buyer, while table 8 – the results of this valuation obtained from equation (5).

The difference between the values to the seller and the buyer:

$$V_r^S - V_r^B = 33\ 670\ 284 - 31\ 183\ 095 = 2\ 487\ 189\ (\partial.e.)$$

This difference is eliminated by the method of successive approximations by selection of the desired value of the existing land improvements.

The results obtained through the task by using the Excel built-in function "goal seek" are as such: desired value of the existing land improvements $V_{B0} = 5262660$ CU; value of the reconstructed property $V_r^S = V_r^B = 30549716$ CU.

The total market value of the land with the existing improvements on the date of the evaluation is the sum of market values:

$$V_0 = V_{L0} + V_{B0} = 7\ 868\ 085 + 5\ 262\ 660 = 13\ 130\ 745$$
(rounded to 13 100 000 CU).

Table 5.   The parameters for the calculation of the value to the seller

During the reconstruction period, quarter	*4*
Reconstruction costs at the beginning of the 1st period, E_0	*7000000 CU*
Reconstruction costs at the beginning of the 2nd period, E_1	*5000000 CU*
Reconstruction costs at the beginning of the 3rd period, E_2	*1000000 CU*
Reconstruction costs at the beginning of the 3rd period, E_3	*500000 CU*
Reconstruction costs at the beginning of the 3rd period, E_4	*500000 CU*
Rate of return on capital, Y	*14%*
The value of land as vacant, V_{L0} *(received on 1 stage)*	*7 868 085 CU*
The initial value of the improvements appraisal, V_{B0}	*8 000 000 CU*

Table 6. The results of calculation of the value to the seller

Time, i (in fractions of a year from the date of the evaluation)	Costs, E_i	Factor for accumulation $(1+Y)^i$	Accumulated by the end of the construction cost, $E_i(1+Y)^i$
0,00	22 868 085	1,140	26069617
0,25	5 000 000	1,103	5516310
0,50	1 000 000	1,068	1067708
0,75	500 000	1,033	516650
1,00	500 000	1,000	500000
Total present worth $V_r^S =$			**_33 670 284_**
Profits entrepreneur			3802199
Profits entrepreneur %			11,29%

Table 7. Initial data for calculating the value to the buyer

1st year effective gross income	9000000	Operating expenses	30%
2nd year effective gross income	12000000	Period of economic life, years	10
3rd year effective gross income	12000000	Depreciation	линейная
4th year effective gross income	10000000	Real estate tax rate (TR), % of taxable (market) value	2%
5th year effective gross income	7000000	Depreciation at date of sale	50%

Table 8. The results of calculation of the value to the buyer

	Year number				
	1	2	3	4	5
Effective Gross Income	9000000	12000000	12000000	10000000	7000000
Operating expenses	-2700000	-3600000	-3600000	-3000000	-2100000
Taxable value (TV)	33670284	30303256	26936227	23569199	20202171
Real estate tax (TV× TR)	-673406	-606065	-538725	-471384	-404043
Net resale proceeds					16835142
Total net income	5626594	7793935	7861275	6528616	21331099
Discount factor	0,877	0,769	0,675	0,592	0,519
Present value	4935609	5997180	5306137	3865465	11078704
Total present worth V_r^B	**31 183 095**				

6. Summary

Thus, using the basic formula of the income approach for the value of potential and distressed properties and without changing its essence, we have obtained the equation of real estate value estimation, which in the process of calculating the value of the property allows us to explicitly show the pricing mechanism for the seller and the buyer of the finished commercial property.

Thus the value to the seller is formed as the sum of his investments in the acquisition and conversion of the asset and entrepreneur profit, formed by the sum of the opportunity costs incurred due to investments. The value to the buyer is determined in full compliance with the income approach principle – as the present value of future earnings, which object of investment after its construction or conversion can generate.

Equation of value estimation enables you to calculate the market or investment value of both vacant and partially or totally improved land.

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[i] **Equation** (math.) – analytical writing of task of finding argument values that are equal to the values of two specified functions, for example, $G(x,a,b,c)=F(x,a,b,c,d)$. So, you need to find the value of x that will make fair equality of functions F and G (the author 's).

[ii] Here and further under the investment property let us understand a property purchased to generate future income through rent or sale for speculative purposes (the author 's).

[iii] Entrepreneurial incentive is a forecasted or calculated entrepreneurial profit by an appraiser [1].

[iv] Here Depreciation is used to calculate taxable value (the author 's).

[v] Evaluation of vacant land can be done by any known method of land valuation, for example, by comparing sales of free plots of land, compared to the estimated land (author 's).