# The Value of Real Estate between Building and Land

## Antonio BENVENUTI, Italy

**Key words**: Real estate development, Valuation

## SUMMARY

The allocation of the property value between the building and the land aims to separate the land value from the building value. This kind of operation is also required by the International Accounting Standards to calculate the amortization of tangible assets. The contribution of each part on the property's value is expressed through the complementary ratio; therefore, there is a complementary ratio of the area and a complementary ratio of the building. Generally, the measure of these ratios is based on the price survey of the building areas and on the estimate of the cost of the reconstruction of the building. This study proposes a financial model (or cost approach) for the calculation of the complementary ratio of the area when building areas are not available, and some insurmountable difficulties can be met during the estimation of the cost of reconstruction and of the depreciation rate of old buildings. These circumstances are recurrent in the big cities with old facilities as often happens in the Italian real estate market.

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## 1. INTRODUCTION

In the evaluations for financial reports, the International Valuation Standards (IVS), following the International accounting standards/International financial reporting standards (IAS/IFRS 16), indicate the allocation of a building's value as an operation that assigns a separate value to the land and that of the building. In fact the elements/parts of a property do not depreciate in equal measure, whilst the building is considered subject to depreciation, the land usually does not experience any loss in value.

The main procedures in the evaluation of an area can be summarized as: the market orientated procedures, the transformation value, the allocation of the property value according to the complementary ratio of the land and the land residual technique/ residual method.

The market orientated procedures foresee the direct comparison between the area being evaluated and similar lots of land, for which there is real information available on the recent operations in the market regarding buying and selling and rents (IVS GN1 – 5.25.1).

The transformation value of a building area or of ready redevelopment or of land in lots considered to be in the process of development or redevelopment or subdivision into lots, estimating the revenue and the costs related to the respective property process (European valuation standards EVS Appendix 1 A 1.87).

When it is not possible to apply the previous procedures one can resort to allocating the property value in terms of the lands complementary ratio (IVS GN1 – 5.25.3) and the land residual technique (IVS GN1 5.25.5) or the residual method (EVS Appendix 1).

## 2. THE COMPLEMENTARY RATIO

One of the most important relationships of complementarity is represented in the connection between the land value and the property value, made up of the building and the land. The calculation of the land's complementary ratio c can be carried out two ways:
-   in the first way one considers the value of the land $V_t$ and the value of the property V:

$$c = \frac{V_t}{V}$$

-   in the second way one considers the depreciating cost of reconstruction $V_f$ of the building and the property value.

$$c = 1 - \frac{V_f}{V}$$

Often in professional practice the complementary ratio of an area is estimated informally and in empirical way within a range including the minimum calculated for the peripheral area and the maximum as is indicated for the central areas.

The complementary ratio is used in the search for rate of capitalization carried out with the band of investment applied to the parts of a property (land and building components). The capitalization rate of a property is calculated by summing the land rate, for the relative complementary ratio, with the building rate, for the complement to the unit of the complementary ratio of the land, in the following way

$$i = c * i_T + (1 - c) * i_F \quad [1]$$

In the band of investment the capitalization rate of the property represents the average rate of opportunity contemplated for the respective complementary rates, and has the characteristic of being included in the rates of opportunity.
The capitalization rate interpreted as the rate of opportunity represents characteristics intermediate between the land investment and the building investment and is associated with a middle position for risk, duration, variations in value and management. For this reason the building rate is expected to be greater than the land rate and the capitalization rate lies between the two opportunity rates ($i_F > i > i_T$). The hypothesis defines the "principle of valuation coherence".
The rates of opportunity indicate the range in which the capitalization rate falls, in other words they represent the minimum and the maximum capitalization rates. They deal with the extreme upper or lower range of the open set of the capitalization rate. The land rate is the minimum rate of capitalization when you only consider the land ideally without the building; in this circumstance the complementary ratio of the land is equal to the unit because the building does not exist (c = 1 and i = $i_F$). The building rate is the maximum when one considers at the other extreme only the building without the land. In this circumstance the complementary ratio of the land is null (c = 0 and i = $i_F$) as the investment consists entirely of the building.

Thus the complementary ratio of the land is calculated with the formula [1] of the band of investment as an inverse problem in the following way:

$$c = \frac{i_F - i}{i_F - iT} \quad [2]$$

This formula represents the financial model for the calculation of the land's complementary ratio. It concerns a financial model in so far as it expresses the complementary ratio in terms of rates of opportunity and is exactly between the fractions in range included between the property rate and the capitalization rate (a numerator) and the range of the opportunity rates (a denominator). In practice this transforms the land's complementary ratio expressed in the property components, into a complementary ratio between the financial components of the investments.

For statement of completeness the building's complementary ratio $c_F$ can be calculated with the formula [2] in the following way:

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$$c_F = 1 - c = \frac{i - i_T}{i_F - i_T}$$

## 3. THE APPRAISAL OF THE VALUE OF THE LAND AND BUILDING

For appraisal and accounting purposes the financial model of the complementary ratio of the area aims to supply indications for a calculation that refers to a single property.

For these purposes an exact appraisal is required of the complementary ratio of the land $c_o$ referred to the property subject to evaluation. This is possible with the financial model of the formula [2], that concerns the capitalization rate $i_o$ of the particular property to be evaluated, in the following way:

$$c_o = \frac{i_{Fo} - i_o}{i_{Fo} - i_{To}} \quad [3]$$

Where $i_{Fo}$ and $i_{To}$ are rates of opportunity for the property to be evaluated.

The previous formula [3] in the direct capitalization can be presented by substituting the capitalization rate with the ratio between the revenue $R_o$ and the value $V_o$ of the property to be evaluated, in the following way:

$$co = \frac{i_{Fo} - \dfrac{R_o}{V_o}}{i_{Fo} - i_{To}}$$

The land value $V_{To}$ and the property value $V_{Fo}$, components of the property to be evaluated, can be calculated by multiplying the property value for the actual complementary ratio, as follows:

$$V_{To} = V_o * C_o$$

$$V_{Fo} = V_o * (1 - C_o)$$

The rates of opportunity find a confirmation outside the actual property and financial situation and appraisal logic.

The financial model of the land's complementary ratio complies with the laws of the international appraisal standards.

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## 4. OPPORTUNITY RATES

The detailed appraisals of the land rate and the building rate are carried out by: a) respecting the meaning of the opportunity rates of alternative investments; b) using the conditions of the atypical property markets, where the right to build is separated from the land and it is possible to spontaneously recognize the opportunity rates as ratios between the atypical land and property and the corresponding area prices and construction costs; c) for the land rates in the markets of free areas, where it is possible to spontaneously collate leases of the area and the corresponding prices of buying and selling. In all other circumstances the two opportunity rates remain undisclosed and their appraisal is based on the profitability of competing and similar investments.

In the study that is subsequently illustrated, we refer to properties made up of new small buildings situated in an area of residential zoning in the suburbs. This requires surveys of price samples of the building area and a sample of the prices for finished apartments to calculate the complementary ratio, and the surveys of a sample of rental apartments for the calculation of the capitalization rate.

In the search for the land-to-value ratio and opportunity rates one operates in the intersection between diverse market segments, represented by the buying and selling segment of apartments, the rented apartments segments and the segment of prices in the building area. The land-to-value ratio and the opportunity rates can be referred to the apartment segment of the market.

In a newly-built urban area within a short distance from the centre, a market segment of new property was identified, which consisted of small buildings in a condominium with apartments for civil residence.

The intersection of market segments has focused in detail on: The market segments of buying and selling of apartments; and the market segment of building areas.

Three appraisal samples were surveyed: the first was made up of n.3 small buildings with a total of 15 apartments, of which the market prices were surveyed; the second sample was made up of n.3 apartments in a single small building, of which the location leases were surveyed; the third sample was made up of n.2 lots of land in a ready to be built area, of which the market prices were surveyed.

In the analysis, only the commercial surface was considered, given the nature and the aims of the study and the fact that determination was carried out on the gross capitalization rate.

The research on land-to-value ratio and the land and building rates was carried out in the first sample of which the market prices are known, whilst the location leases and the area value were estimated for the second and third samples respectively.

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| PRINCIPLE SAMPLE STATISTICS | | | | | | |
|---|---|---|---|---|---|---|
| Sample | Number | Surface area and price | Average | St.Dev. | Min. | Max |
| Apartment Prices (first sample) | 15 | Surface area (mq) | 100,47 | 19,77 | 70 | 119 |
| | | Market price (€) | 167.400,00 | 30.558,61 | 120.000,00 | 198.000,00 |
| Apartment location lease (second sample) | 3 | Surface area (mq) | 53,67 | 4,04 | 50 | 58 |
| | | Lease (€/year) | 8.000,00 | 692,82 | 7.200,00 | 8.400,00 |
| Area prices | 2 | Surface area (mq) | 1.160,00 | | | |
| | | Market price (€) | 170.000,00 | | | |

Following the survey of the information, one can estimate the location leases and the area value of corresponding samples.

| DATA FROM THE PROPERTY APPRAISAL ANALYSIS | | | | | |
|---|---|---|---|---|---|
| | Area | | Property | | |
| Property | Surface area (mq.) | Value (€) | Commercial area (mq) | Value (€) | Location lease (€/year) |
| 1 | 660 | 96.723,00 | 345 | 560.000,00 | 27.706,70 |
| 2 | 1.055 | 154.610,25 | 619 | 1.030.000,00 | 54.018,52 |
| 3 | 1.047 | 153.437,85 | 543 | 921.000,00 | 52.764,90 |

So we can calculate: the capitalization rates Ij with I = 1,2,…n, of the properties (small buildings), expressed as a ratio between the sum of the location leases Rj and the sum of the prices Pj of the apartment components:

$$Ij = \frac{Rj}{Pj}$$

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And the land-to-value ratio Cj of each property, as a ratio between the value of the area Vtj and the sum of the prices of the apartment components:

$$Cj = \frac{Vtj}{Pj}$$

| LAND-TO-VALUE AND BUILIDING-TO-VALUE RATIOS AND PROPERTY CAPTILIZATION RATES. | | | |
|---|---|---|---|
| Property | Land-to-value ratio (Cj) | Building-to-value ratio (1-Cj) | Capitalization rates (Ij) |
| 1 | 0,1727 | 0,8273 | 0,0495 |
| 2 | 0,1501 | 0,8499 | 0,0524 |
| 3 | 0,1666 | 0,8334 | 0,0573 |

In the study sample, the average land-to-value ratio was 0,1631, the average building-to-value ratio was 0,8369, the average capitalization rate was 0,0531.

To calculate the land rate and the building rate of the market segment we impose a system of linear equations, composed of as many band of investment equations as there are properties studied, proposing the opportunity rates as an unknowns and the capitalization rates as knowns, in the following way:

$$\begin{cases} c_1 * i_T + )1 - c_1) * i_F = i_1 \\ c_2 * i_T + )1 - c_2) * i_F = i_2 \\ \qquad \ldots\ldots\ldots \\ c_n * i_T + )1 - c_n) * i_F = i_n \end{cases}$$

The solution to the system of equations leads us to the land rate and the building rate of the market segment studied. Once the opportunity rates have been calculated, the land's complementary ratio can be calculated using the financial model.

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| RESULTS OF THE APPRASIAL ANNALYSIS OF THE MARKET SEGMENT | |
|---|---|
| Data | Average |
| Surface area (mq) | 100,47 |
| Apartment price (€) | 167.400,00 |
| Apartment unit price (€/mq) | 1.666,22 |
| Unit price of area €/mq) | 146,55 |
| Location lease (€/year) | 8.966,01 |
| Unit price of location lease(€/mq. year) | 92,29 |
| Land-to-value ratio | 0,1631 |
| Building-to-value ratio | 0,8369 |
| Capitalization rate | 0,0531 |
| Land rate | 0,0174 |
| Building rate | 0,0600 |

## 5. CONCLUSIONS

The allocation of a property's value between the building and the land is required for various practical purposes and can be carried out using the land's complementary ratio.

The financial model of the land's complementary ratio presents the problem of the allocation of value on a rational basis, making use of residual techniques and the band of investment and in this way absolves itself of the standard international laws.

The residual techniques appraise a whole property, comprised of the land and the building, starting with one of the component parts of known value.

The other part of unknown value is calculated using the appropriate rates for the two components. It deals with the opportunity rates that regard the corresponding investments considered in the abstract: the land rate relating to rent and the building rate connected to market capital.

The land rate is the capitalization rate specific to land without the building; the building rate is the capitalization rate specific to the building without land. Both of which represent respectively the minimum and maximum capitalization rates.

In the band of investment the property capitalization rate represents the midpoint between the averages of the two opportunity rates considered for the respective complementary ratios. Thus the capitalization rate holds a middle position in the range between the land rate and the building rate.

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The financial model of the complementary ratio is based on the inverse problem of the band of investment and is therefore expressed in terms of opportunity rates and the capitalization rate.

The main outcome of the financial model regards the separation of the land and the building value from property data for appraisal and accounting purposes, through the specific complementary ratio calculated for the property subject to evaluation.

The opportunity rates are hidden rates but they obey a stringent economic and appraisal logic and they can take concrete form as real rates when the land and the building are the subjects of contracts, rights and partial interests exchanged on the market.

In fact, in the case of the study presented, the search for the opportunity rates of the land and of the building was carried out on a concrete market segment, purposefully surveying two appraisal samples with rental prices of apartments in a condominium and a sample of prices of the building area.

The market segment refers to new properties, made up of small residential buildings with apartments in condominiums, in a newly built up area.

The results of the appraisal analysis indicate for the property market an intercepted average land-to-value ratio of 0,1631 and consequently a building-to-value ratio of 0,8369.

The opportunity rate of the land was 0,0174 and the opportunity rate of the building was 0,06004.

## REFERENCES

- Appraisal Institute (2001) – The appraisal of Real Estate. Appraisal Institute, Chicago;
- Carrer P. (1992) – Il dirito di superficie in Italia. Arel: Quaderni istituzionali, n.8 Roma;
- IVS (2001) – International Valuation Standards. IVSC, Londra ;
- RICS (2004) – Appraisal and valuation standards. Rics Book, Coventry;
- Famularo N (1947) – La stima dei fabbricati – Edizioni Agricole, Bologna
- Simonotti M. (1997) – La stima immobiliare: con principi e applicazioni estimative . UTET Libreria, Torino;
- Simonotti M. (2005) – Manuale delle stima immobiliari. Geoval, Roma
- Tecnoborsa (2005) Codice delle Valutazioni Immobiliari. Tecnoborsa, Roma;
- Tegova (2003) European valuation standards. Bell & Bain, Glasgow;
- Simonotti M. (2005) – Il valore di un immobile tra fabbricato e terreno – Il Sole 24 Ore, Estimo e Territorio n.11 Novembre 2005;
- Simonotti M. e Benvenuti A. (2005) – Incidenza dell'area in un segmento di mercato immobiliare – Il Sole 24 Ore, Estimo e Territorio n.11 Novembre 2005;

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