

# DECISION-SUPPORT TOOLS AND ASSESSMENT METHODS

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## Summary

At the present time, property market value is most frequently assessed using the revenue and the comparison method of evaluation. This paper informs about an innovative method that assesses existing building stock using index maps of the properties' historical market prices. This method may be used for evaluation of properties for which a market price assessment has been elaborated in the past and/or have been transferred in recent years.

**Keywords:** Evaluation of properties, property market value, statistics, software.

## 1 Description of the innovative method

In the last decade, the Czech property market has gone through a significant development. More frequently than ever properties are becoming a subject of business activities, are used as a mortgage, are used in the realization of investment projects, etc. Thus, in case of a great many properties, a set of documents has been built up that maps their life cycle. In case a market value assessment was elaborated in the past and/or there is an older purchase agreement concerning the evaluated property, the assessor gets important information about the historical market value of the evaluated property. However, the current evaluation methods do not enable an appropriate use of such information. Nevertheless, the historical market value gives the assessor objective information on the property value at a particular date in the past. Provided we are aware of the extent of the historical and current market price alteration concerning a given category of properties with a given location, we can derive its current market value using this historical property market value.

The property market value is then calculated through the following formula

$$P_a = P_h * I_c * I_b * I_d \quad (1)$$

Where  $P_a$  ... Current market value of the property calculated using the innovative method.

$P_h$  ... *Historical property market value* found out in the property evaluation documentation (an older market evaluation of the property, an older purchase agreement, etc.).

$I_c$  ... *Index of change in property market value* of the particular property category and location in the time interval delimited by the date of the historical market value assessment and the date of the property evaluation.

$I_b$  ... *Index of property physical appreciation*. Used in the case of property renovation, reconstruction, annex or penthouse construction in the time period delimited by the date of the historical market value assessment and the date of the property evaluation ( $I_b \geq 1$ ). The index is set by means of an authorized valuation. The index value depends on the range of the executed construction work. Provided that in the determined time interval the evaluated property renovation, reconstruction, annex or penthouse construction was not executed, the index value is set to 1.

$I_d$  ... *Index of property depreciation* in the time period delimited by the date of the historical market value assessment and the date of the property evaluation ( $I_d \leq 1$ ). The index is calculated by means of a linear depreciation method.

## 2 Utilization of the software EVAL for valuation

The EVAL software is used to calculate the monthly changes in property market value. It systematically assembles, analyzes and assesses the advertised property price quotations. For each half year, the software has assembled over 650,000 price quotations concerning sale or rental of apartments, family houses and plots of land. All offers are continuously stored in a database and are the subject of a thorough analysis of the data's credibility. Thus every price quotation is assessed in light of the objectivity and accuracy of presented information and it is compared with older quotations. Moreover, repeatedly advertised properties are searched, the integrity of presented information is assessed, etc. Thus approximately 250 possible errors, purposely misrepresented information and manipulation malpractices are verified concerning each quotation. In case of the slightest discrepancy (for example designed manipulation of information by real estate agent, purposely incomplete information on the presented property, duplicity, etc.) the given assessed quotation is discarded from the database. The monthly changes in property market value are thus calculated in the EVAL software using the afore-mentioned database of pre-assessed credible price quotations.

The key variable of the historical market value method is represented by the *Index of change in property market value*  $I_c$ . For determination of its value the EVAL software has been developed that calculates individual monthly changes in property market value according to the given category and location. The *Index of change in property market value*  $I_c$  is then calculated using the following formula

$$I_c = \prod_{i=M+1}^{n-1} I_{kl}^i * I_{kl}^T \quad (2)$$

Where  $I_{kl}^i$  ... Monthly index of change in property market value for the  $i$ -th examined month, the  $k$ -th category of property and the  $l$ -th property location.

$I_{kl}^T$  ... Monthly index of change in property market value in the month of evaluation. The index value is calculated by the EVAL software using the trend in property market value development for a given category and location.

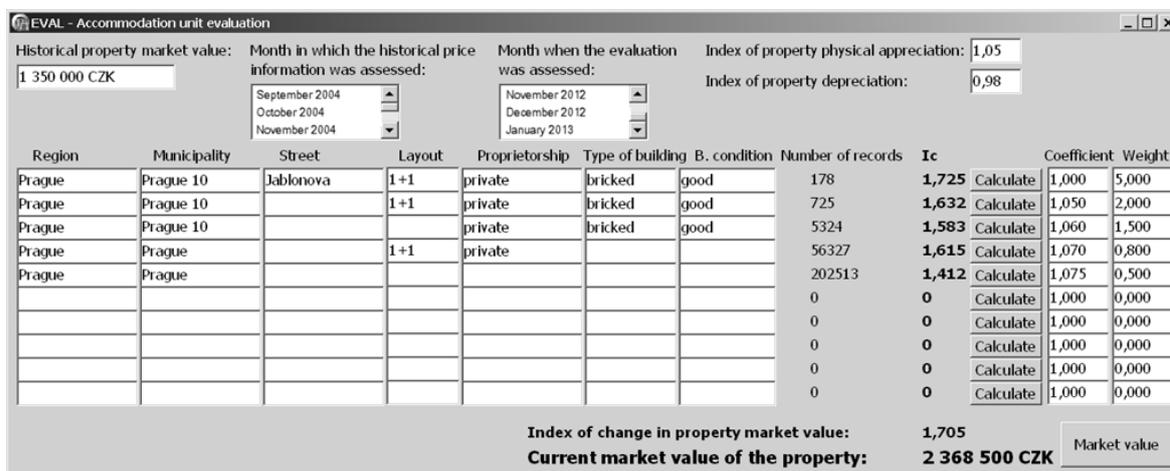
- M* ... Month for which the information on the evaluated historical property market value was assessed. (e.g. Provided an older purchase agreement was concluded on October 16, 2004 then  $M = \text{October 2004}$ ,  $M+1 = \text{November 2004}$ .)
- n* ... Number of months between the date of the historical market value assessment and the date of the property evaluation.

Figure 1 displays the working window of the EVAL software for apartment evaluation. When evaluating a property the user first enters the evaluated historical property market value and selects the month in which the historical price information was assessed and the month when the evaluation is assessed. Afterwards he determines the value of the index of physical appreciation of the evaluated property and the index of its depreciation rate.

When calculating the index of change in property market value the user first defines several comparison databases that, according to his opinion, are suitable for comparison with the evaluated property. The first comparison database usually represents the same property category and location as the evaluated property. The highest weight is therefore assigned to this comparison database and the Coefficient of adjustment is set to 1. Due to the very limited degree of aggregation this comparison database is only used provided there is a sufficient number of price quotation records in the EVAL software database (> 15). The other comparison databases are then usually characterized by a higher degree of aggregation according to the assessor's opinion. These comparison databases therefore encompass a higher number of records. With the increasing degree of aggregation it is recommended that the comparison database significance be decreased by using a lower value of database weight.

For a better understanding of the principle behind the historical market value method, Figure 1 displays an example of market evaluation of an accommodation unit 1+1 in Jablonova street, Prague 10. Five comparison databases have been used for the evaluation process.

This method is more complicated than is described in this paper. Due to the limitation of the scope of the paper, however, a complete description of the method cannot be presented.



*Fig. 1 An accommodation unit evaluation using the historical market value method.*

### **3 Conclusions**

The historical market value method represents an innovative way of property market evaluation. It stems from the principles of the comparison evaluation method. It is usable for determining the market value of apartments, family houses and plots of land. It may also be used for the determination of the usual rate of the apartment or family house rent and for the determination of a property market value at an older date of evaluation.

### **References**

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