

THE UNCERTAINTY OF REAL ESTATE MARKET VALUE AS A FOUNDATIONAL CATEGORY IN THE DECISION-MAKING PROCESS

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Purpose: The study aims to analyze real estate market value uncertainty, focusing on its impact on decision-making processes. It identifies uncertainty sources and evaluates their consequences for market participants. The hypotheses tested are: (H1) Market value lacks a single definitive level, (H2) Uncertainty is intrinsic to valuation and persists even in controlled conditions, and (H3) Its magnitude is significantly greater under real market conditions.

Design/methodology/approach: The study employed a research experiment involving two groups: (a) undergraduate students and (b) appraiser candidates. Participants estimated a commercial property's value using the income approach with simple capitalization and DCF techniques, all based on identical input data.

Findings: The study revealed significant discrepancies in value estimates, stemming from varying interpretations of inputs in the valuation model. It confirmed that valuation uncertainty is intrinsic, present even in controlled environments, and amplifies under market conditions, necessitating a revised approach to presenting results.

Research limitations/implications: The experiment was conducted under lab conditions, which limits the influence of external market factors. Future research should take into account more complex information environments. It is expected that the level of uncertainty will then be significantly higher.

Practical implications: The study emphasizes the need to revise valuation result presentations, as single-point estimates can mislead market participants. It suggests incorporating tools like numerical ranges, sensitivity analyses, and scenario analyses into reports to address inherent uncertainty and enable more informed decision-making in the real estate market.

Social implications: Transparency and standardization of valuation processes contribute to stabilizing the real estate market and more effective management. The topic of valuation uncertainty undertaken so far, mainly by very narrow specialists, has important social and practical implications and should be disseminated to decision-makers in the private and public sectors.

Originality/value: The article contributes to the literature by providing experimental evidence on the sources and extent of uncertainty in real estate valuation. The findings underscore the need for professionalization and standardization to enhance market stability and decision-making quality.

Keywords: Market value, Property valuation, Uncertainty, Decision making process.

Category of the paper: Research paper.

1. Introduction

The valuation of real estate is understood in two ways. It is (a) the process of arriving at a value, i.e. the valuation methodology, and (2) the result of this process, i.e. the value. The variety of purposes of valuation, which results from the needs expressed by market participants, causes the value of real estate to appear and continues to appear in many different forms. For example, the International Valuation Standards of the Royal Institution of Chartered Surveyors (RICS) distinguish between fair value, investment value or market value (RICS, 2020). In addition, in the EVS (European Valuation Standards), such concepts appear as insurance value, bank-mortgage value, value for expropriation and compensation (TeGoVa, 2022). A distinction between types of value has also been made on domestic grounds, e.g. in Poland, distinguishing, among others, replacement value, market value, and fair value. The most important, from the point of view of theoretical considerations and from the point of view of application, is the market value. It forms the basis of most estimates in market transactions, is also used to calculate fees and taxes, can be the basis for securing debts, and litigation is settled on its basis (Kucharska-Stasiak, 2016). Thus, it performs informational, decision-making, negotiating and advisory (Kucharska-Stasiak, 2001). It is a key concept in establishing informed price expectations while remaining a complex and controversial category¹ (Kucharska-Stasiak, Jarecki 2020).

The importance of value in the market - in particular, market value- and the complexity of the process of arriving at it - has caused the valuation of real estate to be standardized². The standardization of property valuation does not make the market value given by the appraiser become the amount that will be paid for the property. The result of the valuation process is a professional opinion of value made by a specific expert. The value is not a fact; it is an estimate, a hypothesis of the price obtainable for the property. This estimate is never

¹ This is because market value is not an intrinsic characteristic of a commodity, good or service to which it is attributed. However, the collective perceptions of market participants are formed due to the competition of subjective valuations (Mooya, 2016).

² This process began as early as the late 1970s through such professional organizations as RICS TEGoVA (The European Group of Valuer's Associations), USPAP (Uniform Standards of Professional Appraisal Practice), and later in the 1980s under the IVSC (International Valuation Standards Council, (originally IAVSC International Assets Valuation Standards Committee) (Grzesik, Żróbek, Żróbek, 2007). Valuation standards, a set of behaviours, systems, values, norms, definitions, and procedures, were developed as part of the effort. The result of standardization is the unification of definitions of the market value of real estate, as well as the development of a common interpretation (RICS, 2020; TEGOVA, 2022). Attempts at standardization have also been made in terms of methodology. However, despite the same roots in the form of economic theory, this has not been achieved (the existing state of affairs is due, among other things, to the different institutional conditions prevailing in different regions of the world) (Kucharska-Stasiak, 2016).

accurate; it carries a dose of subjectivity (Kucharska-Stasiak, 2017). This means that uncertainty is inherent in any opinion of value. It accompanies the valuation of all goods, but as Evans points out, the problem faced by the expert in estimating the market value of real estate is a much more complex problem than determining value in other markets³ (Evans, 2004). The more individualized the subject of the transaction, the less market activity, the more complex the business environment, and the more complex the objectification process. The appraiser, using observation as a research method, learns only some of the characteristics of things and the relationships that exist between them⁴. An important aspect affecting the valuation process and, consequently, property values is also the limited capacity of the human mind to process a large amount of information - heuristic thinking, as well as its interpretation (Jarecki, 2020).

Thus, the market value is a hypothesis of the price possible in the market, under certain conditions, estimated by a specific expert. It is an *ex-ante* category, referring to the future. It represents an imperfect attempt to objectify the behaviour of market participants (Adamiczka, 2017). However, such a perception of the market value category is rare, as noted, among others, by N. French and L. Gabrieli. Recipients of valuation often equate value with price (French, Gabrieli, 2004). They do not perceive its uncertainty. The authors of the Mallinson report also come to a similar conclusion, claiming that even though valuation, understood in terms of the result of an estimate, represents an expert's opinion of value, recipients (individuals, companies, public entities) are inclined to treat it as if it were a fact (Mallison, French, 2000). Researchers and practitioners note that the implication of a misunderstanding among recipients of the uncertainty of the valuation may be a downgrading of its status - the legitimacy of its preparation. However, the main problems in this area relate to the effectiveness of strategic decision-making and planning processes. It is also often discussed in courts (Kucharska-Stasiak, 2016). Uncertainty in valuation, especially the unconscious, hinders decisions on the purchase, sale or modernization of real estate, especially in the long-term strategies of enterprises or public institutions.

Awareness of the uncertainty problem led to work on valuation uncertainty being undertaken by professional organizations of real estate appraisers (RICS, TeGOVA). The first studies emerged after widespread criticism of valuations that followed the real estate crash in the US in the late 1980s (Joslin, 2005). In March 1994, an RICS-appointed team led by Mallinson prepared a report outlining several initiatives that the professional community should undertake to improve the position of the real estate appraiser in the business world - one of which, recommendation No. 34, addressed the need to develop standards for expressing and measuring valuation uncertainty. Discussions on valuation uncertainty revived again after

³ Particularly in efficient markets, where price does infrequently equal value.

⁴ As psychologists point out, learning about the surrounding reality involves constructing specific images and events in the mind resulting from perceived stimulus simulation. There is no total correspondence between what is in the mind and what is in reality. There are as many realities as different mental representations of perceived objects and events (Kucharska-Stasiak, 2017).

the terrorist attack on the World Trade Center towers in 2001. The increasing pressure of the environment led to the next step, which was the commissioning by RICS of another (the first was the Mallison report) report treating the valuation of real estate, this time in the context of the requirements of real estate funds - the Carlsberg report (2002) (French, Gabrieli, 2004). The study's authors also addressed the issue of valuation uncertainty, reiterating the recommendations of an earlier study prepared by Mallinson's team on the need to disclose it in valuation reports. The 2006-2009 economic crisis revealed the need for further research on the quality of valuations. It expanded and popularized the consideration of uncertainty, particularly in global financial markets. In 2008, the Financial Stability Forum (FSF) identified five key reasons for the stagnation—one of the main concerns related directly to valuation and, more specifically, to its transparency. The 2008 crisis made the issue of uncertainty a permanent part of the specialized literature on the subject (Thorne, 2020). The events of 2019 helped to raise it again. The pandemic crisis, resulting in growing fears about the future and regulations restricting freedom of movement - lockdown - also significantly affected the practice of real estate valuation. Real estate appraisers faced the impossibility of estimating the market value of real estate as a result of the lack of market data (a drastic decrease in the number of transactions) and its obsolescence (transactions from before the pandemic period reflected a different state of the market), as well as the difficulty of performing visual inspections of real estate (restrictions). The reaction of the professional community to these events was the preparation of guidelines to assist the work of appraisers, e.g. Valuation Practice Alert - Coronavirus RICS.

Summarizing the results of the discussions held so far, practitioners of valuation have attempted to deal with the problem of uncertainty. They succeeded in leading to its definition and tried to propose a way to express it. A distinction was made between the uncertainty of a single valuation, which relates to input data and is considered typical and atypical uncertainty. Uncertainty is also understood as the difference between valuation and valuation, also referred to as valuation volatility.

Typical uncertainty is a consequence of assessing the magnitude of individual input parameters adopted in the valuation process. To objectify the market, the expert analyzes the real estate market, acquiring a range of data reflecting its participants' typical, most common behaviour. This data often needs to be completed, relates to different time horizons, and, most importantly, relates to properties similar⁵ to the subject of the valuation, not the same. From such an acquired range, the expert selects the most probable figure for a particular property, using both qualitative and quantitative methods and his own expertise. This means that each input is accompanied by uncertainty, involving the ability to assess current and future market conditions. Sources of abnormal uncertainty are found: (a) in the peculiarities of the

⁵ According to Article 4, paragraph 16 of the Law of August 21, 1997, on Real Estate Management, a similar property shall be understood as (...) a real estate that is comparable to the real estate that is the subject of the appraisal, due to its location, legal status, use, manner of use and other features affecting its value.

subject of the valuation, e.g., a huge volume or multifunctional nature of the building. These complicate the process of selecting similar properties, as well as their comparison with the object of valuation, or (b) in the market state as of the valuation date - its low activity, rapid changes in the behaviour of its participants (economic crises, pandemic).

Uncertainty, understood as the difference between valuation and valuation-valuation variability, is oriented to the output data (uncertainty of a single valuation, typical and atypical, concerns the input data). It refers to differences in valuation in the case of the valuation of the same property for the same purpose at the same time but by different appraisers. Its sources are identified: (a) in the uncertainty of a single valuation (typical and atypical), (b) the discrepancy resulting from the different assumptions made in the valuation by different appraisers.

In the case of demonstrating the uncertainty of a single valuation, the following was proposed for its expression, among others: (a) standard deviation, (b) coefficient of variation, (c) triangular probability distribution based on taking three absolute values: most likely, maximum, minimum, (d) Monte Carlo method. Studies on the demonstration of valuation volatility have pointed to, among other things, (1) the regression analysis method, where the explanatory and explanatory variable are nominated valuations prepared by two independently operating entities, (2) the variance as a measure of volatility (Kucharska-Stasiak, 2016).

Ultimately, there is no standardized approach to reporting the uncertainty inherent in property valuation (Kucharska Stasiak, 2016) Many market participants conflate the concepts of price and value, leading to investment and consumption decisions based on flawed assumptions. Presenting the market value of a property as a single figure is inherently misleading, as it fails to account for the uncertainty of the valuation estimate. In the authors' view, this situation warrants urgent change. Therefore, the aim of this study is to identify the sources of uncertainty and to assess its consequences for real estate market participants. The paper poses the following hypotheses: (H1) There is no single level of market value. (H2) Uncertainty is inherent in valuation. It will occur even in a hermetic research environment. Therefore, its level under market conditions (in business practice) will be significantly higher (H3). In order to verify this, the research experiment method was used. Determining how to express uncertainty effectively constitutes the next line of inquiry. Any proposed method must be straightforward and comprehensible for both valuation experts and their audiences. The authors suggest that this could be achieved through the use of numerical intervals or scenario analysis. Lessons could be drawn from methodologies used in the valuation of works of art, given the similarities in the characteristics of these markets (Kucharska-Stasiak, Jarecki, 2022).

2. Literature Review

The topic of uncertainty in real estate valuation has been taken up not only in the application sphere. Researchers also dealt with it⁶. Their works dealt with, among other things, preferred ways of disclosing uncertainty in valuation reports or its causes, e.g. discrepancies in uncertainty understood as valuation variability (difference between valuation and valuation). For example, A. Joslin (2005), dealing with applying the expression of valuation uncertainty, surveyed a group of 100 valuers from the UK. The researcher reached the following conclusions: (1) the respondents were aware of the uncertainty of real estate valuation; (2) the survey showed a convergence in the perception of the sources of uncertainty in valuation by the respondents relative to the conclusions of the literature (67% of the respondents said that there is no possibility of collecting market evidence that would guarantee 100% accuracy of valuation); (3) the fact that the vast majority of the surveyed real estate appraisers (83%) disclose the uncertainty of valuation in their work (however, this is informal in nature); (4) real estate appraisers are divided in their opinions regarding the need for standardization in the expression of uncertainty in valuation (50% of respondents believe it is not needed); (5) appraisers are mostly (67%) positive about the about the possibility of using a so-called tolerance interval for valuation, believing, among other things, that since valuation is an art and not a science, such a procedure would allow for the partial removal of unnecessary work pressure. It should be noted, however, that only a small proportion of respondents expressed approval of the international organizations' desire to standardize such a range. The research on valuation volatility included surveys and experiments conducted among various appraisers, who were tasked with estimating the value of the same property simultaneously for the same purpose based on the data presented or indicating selected valuation input assumptions in the questionnaire presented. A common feature of the studies was that the participating real estate appraisers were given the same set of valuation inputs. They were tasked with selecting those that matched their valuation. The researchers thus wanted to answer whether the very process of processing the information - their selection - would result in a discrepancy in the results.

For example, Hagen and Lord (2003) surveyed a group of 10 real estate appraisers tasked with estimating the value of an office property and another commercial property. The difference between the highest and lowest scores for the office building was 24%, while for the other property, it was as high as 45%. A questionnaire method study by Hutchison and MacGregor Nanthakumaran (1996) found an average difference of 10.7% for office buildings in prime locations in the UK. Brown conducted another study on valuation variability using regression

⁶ Uncertainty studies are deeply rooted in economics, aiming to determine the degree of market objectivity failure in estimating market value, especially in the real estate market context. They are crucial for the correct understanding of valuation reports, not only for real estate appraisers (due to their professional, civil and criminal liability) but also for their clients - the addressees of valuation reports, who make their decisions based on the estimated market value. To this end, several studies and experiments were conducted.

analysis. Using 26 properties valued between 1981 and 1984 by two independent appraisers, he showed that while the values obtained were not identical, the differences between them were minor - the valuations made by one appraiser accounted for about 98% of the variation in the valuations made by the other.

One of the more interesting research experiments was conducted in 2002 and presented at the ERES (European Real Estate Society) scientific conference held in Finlandia (Helsinki) in June 2003. The study's authors, William N.M Smit and Gerjan A. Vos (2003), asked themselves whether the inputs to the valuation were identical and whether the result would be so. The experiment involved several experienced real estate appraisers in good standing, who were tasked with valuing properties using the income approach⁷, simple capitalization and DCF techniques. The appraisers were given a set of identical inputs, both quantitative and qualitative, for the valuation. They were then asked to estimate the value of two properties: (a) an office building and (b) an apartment building. The results of the experiment proved surprising. In the case of the office building, a spread of 8% was observed in the simple capitalization method, while in the DCF model, this spread has already grown to 19%. The result of valuing an apartment building was a spread observed at 7% (simple capitalization) and 14% (DCF), respectively. Above, the researchers concluded with two main conclusions: (1) if the assumption is made that valuation reliability is measured as the spread between the results obtained, such that reliability increases as the spread decreases, it turns out that the simple capitalization model obtains better results than the DCF model; (2) the same set of inputs in the valuation results in different results in terms of the estimated value, the authors of the study note that when appraisers also had to specify inputs - market variables, the discrepancy would be much more significant (these were given in the task) (Kucharska-Stasiak, 2017).

3. Methodology

In this scientific article, the research experiment method⁸ was used. The subject of the study was appointed to the possibility of discrepancies in the estimation of the market value of real estate, resulting solely from the different perceptions of the same input data by students and

⁷ According to Article 153, paragraph 2 of the Law of August 21, 1997, on Real Estate Management, it consists of determining the value of a property on the assumption that its buyer will pay the price for it, the amount of which will depend on the expected income obtainable from the property.

⁸ The method of experimentation involves experimenting with deliberately and artificially created conditions, giving the possibility of any number of repetitions. In this way, by inducing a particular phenomenon and observing and measuring the changes it produces, the researcher formulates conclusions about the object of study. This method is readily used in the natural sciences and the social sciences, including increasingly in economics, which was initially considered a non-experimental science, limited to observation only. This was mainly argued by the impossibility of isolating a particular phenomenon from the whole and the researcher's subjectivity. Experimental research is now also carried out in the real estate market in the area of real estate valuation, being still not very popular (Matel, 2017).

candidates for real estate appraisers. The above accounts for (H1) the lack of a single level of market value due to the appraisal - the expert's opinion of value, and (H2) the inherent uncertainty in estimation. It will occur even in a hermetic research environment. Therefore, its level under market conditions (in business practice) will be significantly higher (H3). As part of the study, a task was prepared to value a commercial property in the income approach, using the investment method, in two variants: (a) discounting income streams and (b) the technique of simple capitalization. The valuation subject was appointed land property developed with a hypothetical office building. The task used a segmented method of data presentation.

As part of the first segment - basic information about the property, the respondents were informed about the specifics of the subject of the valuation (including the location and surroundings, the parameters of the building and its technical-utility condition, the rental area on each floor), the purpose of the valuation, the lease agreements concluded on the property (in two variants), operating expenses, non-rent income. As part of the second information segment - a fundamental analysis of the local market as of the valuation date, the appraisers were familiarized with basic data regarding the local market (where the hypothetical subject of the valuation is located), i.e. the inventory, new supply, the market range of vacancy levels and rental rates, exemptions and rent arrears⁹ - thus aligning the content with the principles of good valuation practice, capitalization rates for "prime" facilities, as well as capital market information needed for in determining the discount rate. The third and fourth segments dealt with parameters of properties similar to the subject of the valuation and transactions of similar properties in a given city. The task presented a dataset of rental rates, vacancy levels, and transactions for properties similar to those of the valuation subject. The fifth segment - an analysis of market rental rates as of the valuation date by floor, provided an alternative for choosing the market level of rental rates, approximating the rich information environment and, consequently, the need for appraisers to make decisions. The last segment, the sixth, dealt with the emergence of a new supply in the form of objects competing with the subject of valuation. Theo elicited the reaction at the stage of estimating return-his return risk generation rates.

4. Results

The experiment was conducted in June 2023 with two research groups. The first consisted of third-year Investment and Real Estate students studying at the Faculty of Economics and Sociology at the University of Lodz, several 39 people (they were asked to solve the task only

⁹ Potential gross income (PDB) - determined on the assumption that the property's potential is realized at 100%, meaning that there are no losses due to vacancies, rent waivers rent and rent arrears, with the income estimate taking into account the rules of the market and the condition of the property being valued.

in the variant of the simple capitalization technique). The second included candidates for real estate appraisers, students completing postgraduate studies in real estate valuation, and students studying at the Faculty of Economics and Sociology at the University of Lodz, with a total of 21 people. Both groups were given a task in which they were asked to estimate the value of an office property using the income approach. The task also included a flow chart for each technique. A summary of the results is provided in Table 1.

Table 1.

Summary of the results of the experiment

Group	Study group 1 (students)		Study group 2 (appraiser candidates)	
	Simple capitalization technique	The technique of discounting income streams (DCF)	Simple capitalization technique	The technique of discounting income streams (DCF)
Disparity ¹⁰	16.20%	-	14.29%	14.00%
Number of results obtained (number of subjects)	12 (39)	-	7 (21)	13 (16)
Maximum score	25 631 994 60 euro	-	25 059 653 33 euro	25 847 205 39 euro
Minimum score	21 479 702 86 euro	-	21 479 702 86 euro	22 228 716 69 euro

Source: elaborated by the authors.

Among the 39 valuations conducted by students, 12 results were recorded, with the highest value reaching 21,479,702.86 euros and the lowest at 25,631,994.60 euros, indicating a discrepancy of 16.20%. The candidates for appraisers were asked to solve the task using two approaches: the direct capitalization technique and the discounted cash flow (DCF) method. The direct capitalization technique was applied by 21 participants, while the DCF method was used by 16 participants. In the direct capitalization technique, 7 distinct results were noted among the 21 solutions. The highest value obtained was 25,059,653.33 euros, and the lowest was 21,479,702.86 euros, resulting in a discrepancy of 14.29%. In the discounted cash flow technique, 13 distinct valuation results were recorded among the 16 solutions. The highest value reached 25,847,205.39 euros, while the lowest was 22,228,716.69 euros, corresponding to a discrepancy of 14.00%. The results of the experimental study indicate that the same set of input data using the same valuation technique may result in different results due to the adoption of different assumptions. This is due to their different perceptions (regarding income, vacancy, operating expenses, and income risk) and their different combinations. There is no single level of market value. Real estate valuation is burdened with estimation uncertainty, which is not eliminated even in a hermetic research environment. It cannot be eliminated; it can only be revealed. One of its sources is the process of arriving at values. A significantly more significant discrepancy between the obtained results could be expected if a similar valuation was made in market (non-laboratory) conditions. The fewer choices there are, the more transparent the market (the more widespread access to information) and the lower the valuation uncertainty.

¹⁰ Discrepancy between maximum and minimum score.

This was also observed when comparing the valuation using the simple capitalization technique and DCF. Even though the discrepancies between the minimum and maximum results do not differ significantly, the number of results obtained varies greatly.

Thus, the research hypotheses adopted in the article have been positively verified. The results of the study also confirm the previous conclusions (contained in the literature review chapter) and confirm that the issue of uncertainty, which was mainly addressed in the 1990s, is still relevant today. The next research step is an attempt to address the identified problem, i.e. the lack of standardization in the expression of valuation uncertainty. The empirical research carried out in this paper also points to the need for greater use of experimental methods in research, rooted in new research trends such as experimental economics, economic psychology and behavioural economics. In the field of property and real estate valuation, only a few such studies have been carried out to date.

5. Conclusions

The market value of real estate, as the basis for decision-making, plays an important role in the functioning of the real estate market, influencing the activities of both private and public sector entities, including companies, financial institutions and individuals. However, as the literature on the subject and economic practice indicate, it is subject to significant uncertainty, which needs to be sufficiently highlighted in the valuation process. It results from the economic situation, the specificity of the market, the specificity of the subject, and also the valuation process itself. The study's results showed that differences in assumptions, perceptions and interpretations of the same input data may lead to significant differences in real estate value estimates (H1). This phenomenon, observed even in a hermetic research environment (H2), indicates that uncertainty is inherent in the valuation process and increases significantly in actual market conditions (H3).

This uncertainty has far-reaching consequences for entities operating in the real estate market. In the private sector, companies and individuals must consider the potential risk associated with valuation uncertainty when planning investments or transactions. This may lead to increased safety margins, transaction costs and, in some cases, investment abandonment. In the public sector, where valuations often form the basis for public asset management, tax calculation and spatial planning, value uncertainty may affect the effectiveness of public policy implementation and resource management. The analysis of the research results indicates that the transparency of valuation processes, revealing its specificity discussed in the article, and access to complete and up-to-date market data contribute to reducing uncertainty. Standardization of procedures, development of open databases and implementation of advanced analytical tools, such as simulation models or statistical techniques, support the objectivity of

valuations and strengthen their credibility. It is equally important to include information about the level of uncertainty in valuation reports, such as tolerance ranges or sensitivity analyses, which allows recipients to understand the results and their potential deviations better.

Despite developing methodologies and tools, it is impossible to eliminate valuation uncertainty. This is due to the very nature of the real estate market - its local nature, diversity of assets and variability of market conditions. The market value remains a hypothetical price, which depends on predictions of entities' future behaviour and experts' subjective assessments. Therefore, the key task of property appraisers is not only to minimize uncertainty by applying best professional practices but also to disclose it appropriately and educate report recipients. To sum up, the uncertainty of the market value of real estate, although challenging, should be treated as an inherent element of the decision-making process. Conscious management of this phenomenon, combined with activities aimed at greater market transparency and standardization of valuations, may support entities operating in the real estate market in making more thoughtful and responsible decisions. Thus, a proper understanding of the role of uncertainty in valuation may contribute to a more effective and stable market functioning.

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