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Non-Standard Determinants of Land Prices in Hedonic Pricing Models: Evidence from Poland*

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Abstract

The main inspiration for conducting this study, based on literary study and their own experiences, is the growing complexity of investment procedures and the dynamic changes in the property market. Traditional valuation criteria, such as location or floor area, are now insufficient, as the market value of land increasingly depends on specific legal, technical and urban planning factors. Understanding these non-obvious factors is crucial for a proper assessment of investment profitability and risk. This study fills a significant gap, as the impact of non-standard property characteristics on their market value has so far received relatively limited attention in the literature. In particular, there is a lack of studies that comprehensively analyse the specific duality of these factors, whereby a single atypical feature may simultaneously represent a significant opportunity or a serious threat to the investment process. The study adopted an interdisciplinary approach, integrating knowledge from the fields of economics, geotechnics, law and urban planning. Qualitative methods were employed, based on the observation and analysis of specific cases from the Polish property market. The analysis was also supplemented by a brief comparison with foreign markets (including Germany, the USA and Spain) to identify differences and similarities in valuation. The results of the study clearly show that unusual circumstances drastically alter the final price of a property. It was demonstrated that favourable factors, such as the possibility of dividing or consolidating a plot, can increase its value by between 25% and 40%. Conversely, encumbrances such as an unresolved legal status, difficult geotechnical conditions or a location on the site of a former cemetery can reduce the price by between 30% and as much as 100%. These findings demonstrate the need for an individualised approach to valuation that goes beyond traditional comparative models.

Keywords: land prices, hedonic pricing models, land value determinants, atypical property features.

Introduction

The land real estate market is one of the most complex segments of the economy in terms of the rules governing it. In property valuation, the primary characteristics analysed typically include location, area, state of maintenance, designation in the local spatial development plan, and access to infrastructure. In addition to these factors, however, there are also other characteristics that affect sale price in less obvious ways. Since property value is a function not only of economic factors but also of legal and technical ones, the valuation of land with unusual characteristics becomes more complex and investment risk increases (Zydroń, Kayzer, Zbierska, Szczepański, 2015). As a result, investment decisions must be based not only on classic comparative methods but also on complex analyses that balance risks and benefits while taking into account numerous qualitative variables—from legal issues and geotechnical matters to administrative constraints arising from local plans, revitalisation programmes, or conservation protection (Parzych, Czaja, 2015). For the purposes of this study, the focus is on the most important characteristics of this kind, which most often include possibility of subdividing

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the plot, possibility of consolidating it with neighboring plots and a few other features that are detailed and described below.

Non-standard determinants of land prices

In practice, participants in the real estate market increasingly encounter cases in which unusual land characteristics determine price more significantly than classic parameters (Zydroń, Kayzer, Iwiński, 2017). These factors—often difficult to notice in the course of an ordinary analysis—may influence value in either direction, decreasing or increasing the value of property appraised by traditional methods.

Possibility of Plot Subdivision

In practice, the possibility of subdivision is one of the most important non-obvious factors affecting property value. This procedure consists in separating smaller land units from one larger property. The subdivision of a large plot—sometimes difficult to sell as a whole because of its high price—into smaller plots that are more financially attractive to buyers may significantly increase the revenue generated from selling the entire landholding. However, the costs and risks associated with such an operation must also be remembered (Schulz, Werwatz, 2004). A plot that can be subdivided into smaller units often attracts investors seeking opportunities to increase profitability. The sale of several smaller parcels, especially in areas of high demand, may generate a total profit higher than the sale of the entire plot as a single property. The possibility of adapting a property to various needs (e.g. the construction of single-family houses, commercial investments or recreational uses) increases its attractiveness, which investors naturally value (Juchniewicz, 2011). A key element here, however, is local spatial planning regulations, which determine whether plot subdivision is possible at all and, if so, what formal conditions must be met (Sale of Real Estate and Land Consolidation or Subdivision, 2022). The possibility of dividing real estate provides investors with benefits such as maximizing profits, increasing capital liquidity, and flexibility in relation to customer requirements (Byś, 2025).

For a plot subdivision operation to succeed, it is necessary to be able to navigate the maze of administrative regulations typical of Polish realities and to carefully calculate the costs associated with the procedure. In addition to the need to comply with the local development plan (or, in its absence, the general plan), significant costs may also be incurred for preparing documentation, carrying out surveying work, and possible infrastructure modifications (e.g. constructing access roads or providing utilities), all of which may affect the final profitability of the operation (Hrycuniak, 2024).

Consolidation with a Neighbouring Plot

As in the case of land subdivision, the possibility of consolidating a small plot or a plot with an unusual outline with one or several neighbouring plots may contribute to creating a more functional and spacious land unit, more attractive in the eyes of investors. This operation, which naturally also requires completion of the necessary formal procedures, makes it possible to eliminate spatial imperfections such as irregular property boundaries. As a result, the land obtained may better meet investment requirements and more effectively exploit the potential of a given location. Situations of this kind admittedly occur less often than the subdivision of larger properties into smaller ones, yet in specific circumstances—such as combining small urban plots in order to use their development potential more efficiently, or transforming agricultural land into building plots in areas with highly fragmented holdings—they are at least an equally effective means of increasing sale value (Głuszak, 2008).

Unregulated Legal Status

The legal status of a property is one of the fundamental elements affecting its value. An unregulated legal status is rightly perceived as a risk factor, since ambiguity in documents or disputed ownership issues may deter potential buyers. Problems such as imprecise boundary definitions, unclear land-and-mortgage register entries, or third-party claims often reduce the perceived value of property. Consequently, a potential purchaser must take into account additional costs and the time needed to regularise the legal situation, which naturally translates into a lower price offer. In practice, the market prices such properties at a discount to compensate for future risks related to administrative procedures or court disputes (Miceli, Munneke, Sirmans, Turnbull, 2011). In Polish conditions, where an unregulated legal status is often a legacy of the turbulent history of the last century, it is one of the most common problems reducing the value of plots and buildings. Because ownership and mortgage encumbrances must be clearly determined before an effective legal transfer of title can occur, unresolved proceedings, boundary disputes, or ambiguities in planning documents generate additional costs and delays in finalising transactions. In practice, this means that plots burdened by legal disputes are much less attractive to investors because of heightened transaction risk and difficulties in securing mortgage financing (Parzych, Czaja, 2015).

Access to Infrastructure

Determining the degree of a property's access to the transport network and utilities (such as electricity, water, sewage, or internet service) is fundamental to any construction or adaptation project. The absence of one of these elements, or difficulties associated with remedying such absence, inevitably leads to higher infrastructure costs. Access to a road in particular is not merely a matter of convenience but also of legal certainty, because "informal" access or the lack of an official entrance/driveway to a plot may raise fundamental doubts as to the very possibility of developing the property. As a result, the price of such a plot is shaped with additional risk and modernisation costs in mind (García, Raya, 2011).

Difficult Geotechnical Conditions

Properties located in areas with difficult geotechnical conditions—for example, in a filled ravine or in an area exposed to landslides—often require costly engineering analyses at the development-planning stage and, later, the application of specialist construction solutions. As a rule, this reduces their investment attractiveness, even where such a defect is partly offset by an attractive location, for example in scenic or ecological terms. Landslide areas in particular pose a serious risk to investors because of the constant and practically never entirely removable threat of a construction disaster. Problems with ground stability may significantly prolong the investment process and thereby make the property less attractive to potential purchasers. For this reason, investors interested in building on unstable land often offer much lower prices to protect themselves against possible future technical and legal problems. Institutions co-financing such projects also often fear the risks of financing them, which may further reduce property value (Glumac, Herrera-Gomez, Licheron, 2019).

Conservation Protection and Archaeological Supervision

An important factor affecting the sale value of property may be its location within a cultural-heritage protection zone, where restrictive regulations apply regarding the preservation of the original character of development. In such a situation, conservation requirements may sometimes significantly limit the possibilities for modernising or adapting a property, especially when it is developed with a historic building. In an area designated in the local spatial development plan as an archaeological site, an archaeologist should be present during any operation involving earthworks, supervising the works and, if any findings are discovered, documenting them and suspending the works for the time necessary to secure or archive the finds; the investor may then continue construction works. The archaeologist's presence is financed by the investor until the completion of the earthworks (Mołczan, 2022). Unusual historical or cultural features of property may be both an asset and a burden for an investor. The unique character of a building or plot may attract tourists, which can be exploited commercially. At the same time, this entails a range of formal limitations, such as the obligation to comply with requirements imposed by the conservation authority or difficulties with modernisation (the need to preserve the original character of the development), which may negatively affect price. In any event, before beginning construction, the investor must conduct costly and time-consuming studies; the discovery of historical artefacts may halt works for many months, and in extreme cases part of the land may even be completely excluded from development. Consequently, where there is no opportunity to profit from the historic character of the area, investors usually avoid plots subject to archaeological supervision, which reduces their sale value by several to a dozen percent, depending on the scope of protection and the costs of investigation (Bertacchini, Revelli, Zotti, 2024).

Revitalisation of the Area

Properties located in areas covered by special revitalisation resolutions may, in the longer term, undergo intensive modernisation and thereby record an increase in value. At the same time, however, the restrictive standards usually applicable in such zones and the resulting high costs of adapting property to new functions constitute a significant risk for investors. Revitalisation resolutions may impose an obligation to meet specified norms and standards, thereby raising investment costs in the short term. On the other hand, they are usually accompanied by legal and financial incentives to incur such expenditure, although these are not always sufficiently attractive to owners and investors. In general, however, this at least allows for some positive improvement in the appearance and functionality of a given area (Couch, Sykes, Börstinghaus, 2011).

Irregular Plot Shape

For obvious utilitarian reasons, buyers prefer plots whose shape allows their optimal use in accordance with applicable building regulations. Rectangular or square plots are the most sought-after, as they are relatively easy to develop and use in accordance with the spatial development plan and, if necessary, to subdivide. An irregular plot shape usually lowers market value because it makes site development more difficult and restricts building possibilities; it also generally requires more complex architectural designs, which further increases investment costs. Buyers often perceive such plots as less practical, which results in a lower sale price; as a consequence, plots with unusual shapes sell more slowly (Sierzputowska, 2023).

Table 1. Factors Affecting the Value of a Plot with an Irregular Shape

Factor	Regular Shape	Irregular Shape
Ease of development	high	low
Design costs	low	high
Subdivision potential	easy	difficult
Buyer attractiveness	high	limited
Sale price	higher	lower

Source: author's own study.

There are situations in which an irregular plot shape may be an advantage. For example, in the case of recreational plots, an unusual layout may add charm and character, while in the case of building plots, the need to adapt development to specific conditions may result in unique architectural solutions. The irregular outline of a plot is also a lesser defect when the plot has a larger area, because the problem of siting and building dimensions then largely disappears. In practice, however, an unusual plot more often causes problems for the owner than reasons for satisfaction.

A Cemetery within the Property

Situations of this kind—in practice more common than might at first be expected—are to a large extent similar in character to the previously described problem of a plot being subject to conservation protection. They are primarily associated with difficulties, because owning a plot located within the area of a former cemetery entails a range of obvious legal, cultural, and practical consequences. Above all, if part of a purchased plot is located on the site of a former cemetery, it cannot be treated as an ordinary building parcel—special protective regulations and restrictions then apply. The most important steps to take in such a situation are to verify the local spatial development plan and establish contact with municipal authorities, the competent cemetery administrator, and the conservation authority. The Act on Cemeteries and Burial of the Deceased clearly states that cemetery land—even inactive cemeteries—is protected and cannot be developed freely; if a plot lies within the boundaries of a former cemetery, it may additionally be treated as a historic site or land under conservation protection (Domagalski, 2013). Acquiring a plot burdened with such a "legacy" as a former cemetery is associated in practice almost exclusively with difficulties. In such a case, all earthworks require the consent of the relevant authorities, while the construction of a house or a commercial investment is in practice impossible without special administrative decisions. There may also be social risk in the form of opposition from the local community to the use of the land in a manner inconsistent with its historical character. For this reason, a plot located on the site of a former cemetery is practically excluded from normal development transactions, and its value falls almost to zero or, at best, remains more than half below market value if relocation of the cemetery is possible (although even where it is possible, this is a long, complicated, costly, and very time-consuming process). In such a situation, it is worth seeking appropriate compensation from the municipal authorities associated with changing the character of the plot to green space or culturally protected land, whether in the form of financial compensation or an exchange for another plot (Chanowska-Dymlang, 2017).

Location of a Geodetic Control Point ("Polygon")

A geodetic "polygon" usually refers to a fragment of land on which so-called geodetic control points are located, used by surveyors to perform precise measurements. The presence of such a point on a plot sometimes has a significant impact on sale price and the attractiveness of the property. This results primarily from the fact that geodetic points are legally protected, which means that the owner of the plot may neither remove nor destroy them independently, thereby limiting freedom to develop the land. This creates development difficulties, because if the "polygon" lies in the place of planned construction, consent must be obtained for relocation of the point, which entails additional costs and formalities (Jarosiński, 1980). Accordingly, some buyers may regard the presence of geodetic points as problematic, which lowers the attractiveness of the plot. The set of possible benefits flowing from such a situation is very limited—chiefly that a plot with a geodetic point is generally better inventoried, which facilitates design and construction and may also prove useful in the event of neighbour disputes over boundaries. In practice, the presence of a geodetic "polygon" on a property is more often perceived as an impediment than as an advantage, especially when the control point conflicts with planned development; this translates to a lesser extent into reduced value in the case of recreational plots on which intensive development is not planned. Over time, this problem may perhaps lose significance, as surveyors today increasingly use satellite measurements in their work, while traditional ranging poles and optical levels are now used on a daily basis almost only by students.

Utilities Running Underground or Across the Surface of the Plot

Referring to the issue of a plot's access to infrastructure discussed earlier, it is worth clarifying that infrastructure networks such as water supply, sewage, gas pipelines, power lines, or telecommunications installations often play a key role in shaping plot value. Their presence—both underground and on the surface—may either increase the attractiveness of property or, in some cases, limit it. Serviced plots with direct access to utilities are generally far more valuable than unserviced ones, because buyers do not have to bear additional connection costs; for this reason, unserviced plots usually attract buyers with more limited resources. At the same time, however, serviced plots may also involve a range of problems:

- the route of underground installations may require protective zones to be maintained, which restricts development possibilities in specific places,
- the presence of poles or overhead lines may reduce property value because of aesthetics, noise, and health concerns (this is particularly important in the case of high-voltage power lines); similar problems are sometimes associated with pipeline installations,
- plots with visible installations are less aesthetically attractive, which often translates into a lower sale price (Juchniewicz, 2011).

Thus, the route of utilities through a plot does not have an unambiguous effect on its value and, depending on the current circumstances, may either increase or decrease it. For this reason, each apparently similar situation should be considered individually.

Other Factors Affecting Property Value

In addition to the unusual factors affecting the sale value of property discussed above, there is also a range of other factors whose weight is smaller or whose influence is difficult to estimate more precisely. In practice, the following are most often taken into account:

- Environmental and aesthetic conditions—such property features as unusual terrain (which does not necessarily mean impractical terrain), the level of sunlight exposure, or the nature and density of vegetation may affect the comfort of using a property and thus its price. In certain situations this may be an asset of a given property (in the case of investors with equally specific requirements), but more often it limits functionality and therefore also its sale value.
- Location of the property in a zone subject to restrictions under the spatial development plan—on land where the plan does not provide for intensive development, plots are often valued lower because their investment potential is restricted. There are, however, numerous exceptions to this rule, for example in the case of "prestigious" areas where low development intensity is itself perceived by investors as an advantage.
- Potential for adaptation to new functions—unusual features of a property may constitute an asset if they are properly used. For example, a plot with an unusual shape may become attractive for specific recreational or infrastructure investments.

Many more such factors could be listed, but that would not be justified in a study of such limited size. It should be remembered, however, that the valuation of property should not become excessively detailed—a closer analysis of a given unusual plot feature makes practical sense only when it is sufficiently visible or objectively significant for its impact to materially influence an investor's decisions.

Impact Analysis

The impact of unusual property characteristics on its sale value is a specific resultant of the factors discussed above. Practically every one of them, in relation to property value, has both upward potential and the capacity to generate risks that reduce investment attractiveness. Estimating as precisely as possible the level of influence of each of them requires an interdisciplinary approach in the valuation process, allowing for the inclusion of complex relationships between the various operational parameters of the property. This requires professional investors to conduct thorough analyses covering the property's investment potential, possibilities for its modernisation, costs resulting from legal, formal, and technical requirements, and so forth. Only such a comprehensive assessment of potential risk and potential gains allows informed acquisition decisions to be made. Although taking unusual factors into account when valuing property for sale increases costs—because of their number and low measurability—it nevertheless allows value to be estimated far more accurately than in the case of more traditional methods.

Table 2. Summary of the Impact of Unusual Factors on Property Value

Factor	Benefits	Risks
Possibility of plot subdivision	Possibility of selling smaller plots, greater investment flexibility	Fragmentation of the investment, additional administrative requirements
Possibility of plot consolidation	Adapting the plot to larger projects and the needs of a given investor	Legal and administrative problems
Unregulated legal status	-	High costs, lengthy procedures, possible future legal disputes
Access to infrastructure	-	High legal and infrastructure costs, technical risk
Geotechnical conditions	-	Investment restrictions, high technical risk, costs of stabilisation works
Conservation protection	Prestige of location, possibility of using tourism-related advantages	Restrictions on adaptation, lengthy and complex decision-making processes
Archaeological sites	Historical and cultural value, tourism potential	Building restrictions, need for archaeological research, high costs and investment delays
Irregular plot shape	Possibility of creating unusual architectural designs, aesthetics	Restrictions on development, difficulties in subdivision, reduction in market value
Cemetery	Historical value, possibility of use as memorial land or a park	Building prohibition, legal restrictions, social opposition, significant value reduction
Geodetic control point ("polygon")	Accurate measurements, certainty of plot boundaries	Restrictions on land use, additional formalities when relocating points
Utilities running through the plot	Servicing the land increases value and attractiveness	Restrictions on development, risk of conflicts with installations, reduced aesthetics
Revitalisation restrictions	Increase in property value in the longer term	Restrictions imposed by the revitalisation plan, costs of adapting the investment

Source: author's own study.

Comparative analysis shows that unusual land characteristics have a similar impact on property value across different countries. There are, however, certain differences resulting from local conditions and the specific features of real estate markets in individual states. For example:

- In Germany, the possibility of subdividing a plot is one of the main factors increasing its value (Schulz, Werwatz, 2004).
- In the United States, legal problems particularly often cause a significant reduction in property value (Miceli, Munneke, Sirmans, Turnbull, 2011).
- In Spain, one of the main factors reducing land value is the lack of technical infrastructure (García, Raya, 2011).
- In Italy, conservation protection sometimes increases property value, especially in tourist centres, whereas away from them it more often contributes to a decline (Bertacchini, Revelli, Zotti, 2024).
- In France, urban revitalisation programmes are a factor that significantly increases land value (Couch, Sykes & Börstinghaus, 2011).

Most of these phenomena can of course also be observed on the Polish real estate market. Their impact on land value is, however, naturally differentiated not only internationally but also within individual countries, where there are sometimes considerable differences in the level of economic development between regions.

Conclusions

Unusual characteristics of land properties have a significant impact on their sale value. They may generate additional investment opportunities, but also increase transaction risk. In practice, this means the need for an individual approach to each property, taking its specific features into account. The set of practical examples presented above made it possible to formulate the following conclusions:

- Unusual land characteristics have a significant influence on determining sale value and thus the price of property.
- In individual cases, these characteristics may either increase or decrease the sale value of property.

The impact of non-standard property characteristics on value has so far received relatively limited attention in the literature. On the basis of the findings presented above, as well as observation of ongoing changes in the real estate market, it may be hypothesised that further research in this area should focus on more precise methods of estimating this impact—including the use of mathematical and statistical methods—so as to enable broader practical application. The following directions for further work may be envisaged:

- Digitisation of data concerning the impact of unusual factors, in order to enable their more objective processing.
- Universalisation of research through macro-scale comparison of valuations of properties with similar non-standard features.
- Development of mathematical models taking this impact into account in investment risk modelling.
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Table 3. Examples of the Impact of Unusual Factors on Property Value

Factor	Brief Description	Increase/Decrease in Value (%)
Possibility of plot subdivision	A large plot was divided into smaller parcels that were more attractive to buyers	+25%
Possibility of plot consolidation	A narrow plot gained value after being combined with a neighbouring one, making development possible	+40%
Unregulated legal status	An inheritance dispute reduced the value of a plot in an attractive location	−30%
Access to infrastructure	A plot without access to electricity, water, and sewage required additional expenditures	−20%
Geotechnical conditions	A plot in a landslide area was sold significantly below the market average	−50%
Conservation protection	Investment restrictions existed, but the prestige of the location increased value	+15%
Archaeological sites	The discovery of remains required research and limited development possibilities	−30% or +20%
Revitalisation restrictions	Plots covered by a revitalisation programme gained value over the course of several years	+20%
Irregular plot shape	An unusual layout made development more difficult and reduced investment attractiveness	−15%
Cemetery	Land of a former cemetery was practically excluded from development and faced social opposition	−100% or −50%
Geodetic control point (“polygon”)	The presence of the geodetic point restricted freedom of land use	−10%
Utilities running through the plot	Underground and above-ground installations reduced aesthetics and ease of land use	−30%

Source: author’s own study.

The future will show whether it will be possible to create more precise instruments for property valuation than those available today. It is already clear, however, that the impact of unusual features on value cannot be neglected, especially in cases where several of them accumulate.

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