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Land Value

Seven Major Questions in the Analysis of Urban Land Values

By ÜNSAL ÖZDİLEK*

ABSTRACT. A review of the literature on land and its value reveals seven sources of ambiguity: 1) a precise definition of the type of land under investigation is frequently absent, 2) the temporal, and 3) the spatial aspects of the land value attributes might be inconsistently specified, 4) the relevance of the valuation methods used is often overlooked, 5) the separate land value is a mere by-product of the total property value as a rule, and thus lacks proper focus, 6) the different agents involved in land markets are not always taken into account, and finally, 7) the explanations for the unpredictable aspects of land value are sporadic. This article explores each of these areas of ambiguity.

Introduction

Investigations into land value reported in the recent literature merely rehash the same concepts from three centuries earlier when land was primarily agricultural. While the basic explanatory elements of classical urban models certainly help one to understand land value patterns, they do not provide satisfactory answers. Such explanations usually refer to notions of spatial equilibrium, homogeneity, and continuity, whereas the crux of the matter is actually about disequilibrium, dissymmetry, and discontinuity.

In the context of most built-up cities where more than ever before the land market is progressively disappearing, land value is becoming

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ever more an elusive concept. We often do not even pay attention to the appropriate value of the land parcel, which seems to be “lost” under the buildings or “merged” with them to create a form of capital known as “real estate.”¹

While the literature on land value and its valuation is extensive, there is unfortunately a certain disorder and vagueness. One can look at any paper on—and/or relating to—land value, and note that responses to one or more of the following questions (referred to as the *7Wh*'s in this article) are entirely or, often, partially overlooked.

1. *What is the type of land under study?*
2. *When is the land value being assessed?*
3. *Where is the land located?*
4. *Which method of valuation is appropriate?*
5. *Why care about land value?*
6. *Who are the actors in the land market?*
7. *Whatever the explanations, are they enough?*

A careful analysis of these *7Wh*'s becomes much more relevant for an accurate measurement of urban land value. Despite its “silence” and apparent “invisibility,” land value continues to shape the dynamics of real estate markets. This is a serious practical concern, for instance, to millions of Americans who experienced its severe effects during almost the last two decades of housing booms and consequent busts. Based on a large amount of data on the housing market for 46 large U.S. metropolitan areas from 1984 to 2004, Davis and Palumbo (2008) pointed out that the remarkable evolution of land value is more significant than we are inclined to believe: by 2004 land value accounted for about 51 percent of the total market value of housing, up from 32 percent in 1984. Recent data published by the Wisconsin School of Business substantiate these increases, showing also dramatic decreases by the year 2009, varying notably across metropolitan areas.²

This article explores each of the *7Wh*'s and leaves the readers to examine what they would do based on the explanation of the problem, review of related concepts, and description of some practical situations. As the crucial theoretical and practical foundation pieces of the land value puzzle are dispersed throughout an extensive (and

somewhat confusing) literature, it also brings them together in a strict articulation.³ Authors of potential manuscripts on the subject of urban land value and valuation (as well as their reviewers) may also find this study particularly useful as a kind of check-list of questions to be addressed.

What Is the Type of Land Under Study?

Intuitively we think of land as a subdivision of the planet we live on. But, asking the question what “land” means will most probably provoke widely differing answers, sometimes very complex. Due to the existence of a variety of definitions, the difficulty in clearly defining land often results in a failure to use any one of them consistently. Even if the challenge of defining land is sometimes acknowledged at the beginning of a given study, in many cases, the term ends up being used loosely as if all types of land have the same meaning.

The different kinds of definition and categorization of land vary according to the discipline (for different ways land is categorized, see, for instance, Duhamel 1998; Fitzsimons and Wescott 2004). What becomes clear from the various explanations is the heterogeneous and very complex nature of land. This often makes land value difficult to determine, because highly differentiated characteristics are involved, and they vary according to the type and usage of the land. For instance, the surfaces allotted to urban roadways and those having condominium towers on them (supposing that the usages will remain unchanged into the future) do not have the same value characteristics; however, both are known as “urban land.” Similarly, a parcel of urban land restricted in use by a right of passage for an alley-way (or easement), for instance, will not have the same value as another one free from any right of passage, even if it were possible to claim that the two are identical in every other respect.

In an entirely built-up city, land market with only a few occasional sales is not as reliable as, for instance, frequently transacted similar single-family dwellings. Before measuring the impact of different factors on land value, we should first provide a precise definition of land type. Most of the few pieces of land transacted on the market are

usually either highly speculated land, parking lots, land with depreciated structures on it, small areas of land stripped by fire, or some parcels of land subdivided for construction projects in a specific zone of the city. It is unwise to consider them as all pertaining to the same market in order to explain and predict the value of other pieces of land with different characteristics, in various locations.⁴

The particularities of land cannot in practice be abstracted and generalized. As each piece of land is unique, it is crucial to clearly identify the kind of land under examination and do an appropriate segmentation. In fact, one primary goal of land type specification is to segment the market and determine the *Highest and Best Use* (HBU) of it as if it were vacant. Then, the value of each and every piece of land can be analyzed in terms of that specific use.

When Is the Land Value Being Assessed?

Cities are dynamic systems growing and changing constantly in a variety of ways due to interactions of social, economic, environmental, religious, political, or technological forces. It is risky—or, at least, misleading—to analyze land value without referring to a specific urban context, precise date, and period of time.

Over time, urban land value varied according to different contexts. For instance, the value of land in 15th-century cities could not have been affected by exactly the same variables that are relevant to urban cities today. Nowadays, people (and therefore, urban activities) seek high-amenity locations, moving from one place to another when their preferences and incomes change. As opposed to cities in the past whose economies were centralized and based heavily on the production of goods, post-industrial cities are characterized more by a decentralized service- and information-based economy (Garreau 1991; Wei 1993). Thus, when land value is analyzed, it is important to know the urban context, because changing market conditions create the need for adjustments in value determinants that vary greatly in nature and number from one context to another.

Within a defined urban context, we may further distinguish between a specific date (a particular day in the year) and a period of time covering multiple years.⁵ In practice, to estimate the value of

a particular piece of land (“subject land”) at a specific date one needs to know the unit prices of a number of similar pieces of lands (or “comparables”) recently transacted (usually within one year) in order to better reflect the state of the market. Under the conditions of an efficient and a homogeneous market, valuation at a specific date thus gives an instantaneous picture of the land’s market value. In addition, rather than observing individual prices, one can study land value differentials over a period of time (i.e., a decade or even a century) by examining, for instance, the evolution of price averages by locality, city, or country (McMillen 1996; Abelson 1997). In this case, since the time scale is enlarged, we cannot presume to be estimating the value of a particular piece of land, as each one would contribute to the explanation of a whole phenomenon by being part of the average.

Considering the time scale further, especially in the framework of empirical models, when we try to estimate the value of the subject land based on the comparables within the same time period, we should not factor in, for instance, “inflation” as a determinant (even if it is one, theoretically), because this rate is assumed to be common during that same time period. But, when we enlarge the time scale of the analysis while trying to include more comparables, we should then consider inflation, because market conditions can vary according to this factor, by types of usage and sector.⁶

Where Is the Land Located?

Urban land value is fundamentally determined by its location attributes. This is well-known in the urban economics literature, but how do we actually define location? There are numerous responses to this question depending on various approaches, each using somewhat different concepts and location attributes, demonstrating the complexity of land value analysis.

Since there is a large number of possible attributes, we can explain them under five different, but not necessarily mutually exclusive, approaches, namely the classical economic, neoclassical economic, geographical, social, and political approaches. To answer the question of how land value can be estimated, the classical economic approach

responds by considering the rent that it generates. The neoclassical economic approach claims rather that land value originates from its utility as judged by the rational agents.⁷ The “location rent” concept of von Thünen and later Alonso’s bid-rent function theory give a spatial orientation to the pure economic analysis by contending that land value has its origin essentially in the trade-off between accessibility and transportation costs. The social approach asserts that the origin of urban land value is neither purely economic nor geographical, but is also social.⁸ Since the particular interests of economic agents or groups may not necessarily comply with the needs and preferences of the community, land development policies try to manage and create a better distribution of urban land. As a result, its value, in turn, would also depend on (and results from) political decisions (e.g., zoning regulations).⁹

As is obvious from the foregoing discussion, land value can be understood via different approaches. Which one is right? Asking this question is, in a sense, responding to it, because we can see that all approaches contribute something to the explanation of land value, even if each may have a different theoretical direction or origin.¹⁰

Identifying and gathering all value attributes (or determinants) related to a particular location according to these approaches does not mean one has to consider them in order to measure the value of a particular parcel of urban land. Practitioners in the real estate appraisal field are aware that on a day-to-day basis what makes land unique are precisely its particular attributes. It is possible that the attributes of one location affect, in the same way, the value of many pieces of land located in the same neighbourhood, as would be the case, for instance, if the distance to the central business district (CBD) were 20 km. When we estimate the value of a certain piece of land by considering the comparables within the same neighborhood, we should not interpret the distance to the CBD as a determinant (even if it is one, theoretically), because it is the same for all the land therein. But, when we enlarge the spatial scale of the analysis by including more comparables from other neighbourhoods closer to the CBD, we should then consider it in the value adjustments because it now varies from one neighborhood to another.

Which Method of Valuation Is Appropriate?

Because of market imperfections and the complexity of the value concept, property valuation is considered an “art” rather than an exact science (Gaul et al. 1992). Despite this, appraisal practice in North America has been making steady scientific progress for more than a century. In fact, its modalities, with the use of three basic methods (sales, cost, and income), were founded by Hurd in 1903, and enriched later on by Babcock (1924), Ratcliff (1965), and Wendt (1974), as well as by many real estate professionals.

Urban land valuation exhibits more difficulties than total property valuation. The main reason for this is the progressively increasing shortage of comparable vacant land transactions.¹¹ Unlike real property valuation as a whole (land and improvements), in the process of land valuation only, the cost method is not applicable. The income method is suitable in the valuation of income-producing land. However, if the land is non-income-producing, such as that under single-family houses, the sales comparison method is preferred. Yet this method becomes useless when there are few sales of vacant land.

Based on these three basic methods, there are multiple techniques for land valuation, such as direct comparison, allocation, extraction, subdivision, and land residual. Despite the availability and applicability of these recognized techniques (as well as others), the literature uses the income capitalization method as a rule. However, in practice the preference of method(s) and/or technique(s) would depend on the type of property and the purpose of the appraisal (e.g., purchase, liquidation, acquisition, insurance, or compensation). The application of one or more of the techniques may be appropriate to different appraisal problems, and may have greater significance in a specific case (e.g., the direct comparison method cannot be used to appraise stadiums because of the lack of comparables).

It goes without saying that the literature provides much more detail on the more commonly used methods or techniques than on those less frequently or never used. If the studies do not focus on the development of a new method (or some of its aspects), a well-known method is used, sometimes leaving aside important technical details as if they were taken for granted.¹² Additionally, the purpose of theories

is to help explain and support the applicable methods or techniques, not to replace them. For instance, the traditional urban economic theories help us to understand some of the land value patterns throughout the city while not dealing with the amount of site-level values (Atak and Margo 1998; Han and Basuki 2001).

Why Care About Land Value?

Although the estimation of total property value is the most common form of evaluation in North America, in almost all cities, both theoretical arguments and practical situations require separate values for land and for improvements (Gloude-mans 1999). The theoretical bases supporting separate value estimates in the literature, which are somehow dispersed and disconnected, rest on the distribution of income amongst the cost agents of production, distribution of marginal utility amongst the property attributes, and distribution of tax incidence amongst the land and improvement value.

The classical income distribution theory clearly distinguishes land as a different cost agent of production. The neoclassical utility theory views land and improvements as different components of the property as well, assuming we consider them in terms of their independent (or separate) contributions to the total value. With respect to property tax incidence, it is especially important to distinguish land from its improvements given their particular economic characteristics, as well as the different tax incidences on the two components (Anas 2003).

Falling in line with these debates, there are also different implementation situations, both in the real estate appraisal field and in urban economics, justifying the importance of separating land value from the value of the improvements: for the allocation of the total property value between land and improvements, for the municipal taxation purposes (Robinson 1999), for the land use and management (Gihring 1999), for the estimation of the depreciation or amortization of improvements (Nandinee 1999), for legal obligation (Kaster 1994), for generating land value maps (Ohno 1985), for the application of cost and income methods, or for the management of mortgage and insurance.

Despite the obvious theoretical and practical grounds, neither the practice of appraisal nor the literature have really taken into consideration the separation of land value from the value of the improvements, with the exception of a few opposing studies (Andelson 2000; Plassmann and Tideman 2003; Hendriks 2005). With buildings all over modern or post-modern cities, perhaps land has lost its specificity as a free space? If land disappears “physically,” does its value cease to exist? Maybe not, because what determines land value is its shape and size, localization within a neighborhood, or its proximity, for instance, to subway stations. After the development (or improvement) of the land, these factors do not disappear—they exist and keep affecting its value. In order to estimate unimproved and/or improved land value, we can identify these attributes and sum up their marginal contributions in order to obtain a total estimate of land value.¹³

There is also some difficulty related to the number of possible attributes affecting land values. This fact is especially complicated in the case of improved urban lands. In fact, no attention is given, either in the literature or in practice, to distinguishing clearly (and objectively) between land- and building-related attributes. For instance, does proximity to the CBD affect only the land or the building value, or both—and why? If both, in what proportions? In the literature as well as in practice, to date, the responses to these questions have been side-stepped by mixing the land value attributes with those of the buildings within the total property price analysis.

Who Are the Actors in the Land Market?

The production and the allocation of urban space is the result of a series of complex decision processes by different economic agents. Land prices observed following an exchange between different parties reveal their utility decisions based on a variety of determinants. Even if each party is distinct in personality and/or attributes, according to the economic theory of utility, all parties will act and consider land value determinants in a similar way. Therefore, studies analyzing property price differentials would reveal little about the individual characteristics of different agents (Palmquist 1984).

The assumption that there is no need to distinguish between different agents is more acceptable when studies consider properties of the same type, because the characteristics of agents and properties tend to correlate (Bartik 1986). For instance, buyers of single-family properties express their preferences for similar types of property attributes that are different from those of high-rise condominium buyers. But the correlation is less evident in the case of the land market. In fact, there are many different actors (governments, land developers, lender institutions, final consumers, intermediaries, etc.), and their characteristics can imply considerable differences in transaction prices. In the case of undeveloped land, for instance, according to Isakson (1997), a limited partnership can pay more than an individual because of its particular situation related to tax impacts and speculation in the land.¹⁴

It is evident that all the agents participating in the land market play different roles. Their financial situation, political power, level of knowledge, and number of members are quite different. For instance, particular buyers and sellers involved in the sale of a parcel of land usually do not have the same objectives and financing levels as governments, banks, or institutions. Also, the actors do not always proceed alone; they sometimes act together, as in the example of a partnership (Calvert 2005).

In practice, this is an important reason why it is useful and preferable to identify who sells to whom, who are the intermediaries, and how they proceed. As the transaction price of land depends on, among other things, the type of actors involved, alone or in partnership, it is important to take into account their differences.

Whatever the Explanations, Are They Enough?

This last question brings attention to some of the unpredictable aspects of land value in addition to the explanations of the previous sections. They are mostly related to the imperfection of the market, some of the operational aspects of the econometric models, the natural hazards, and recent sustainable development concerns.

It is traditionally accepted that real estate markets are imperfect. It is well-known that basic assumptions of a real estate perfect market do

not reflect the true reality in practice (Weinberg 1981). Usually, buyers and sellers are relatively inexperienced and largely uninformed; the prices they negotiate are based on the characteristics of goods that are highly heterogeneous. The imperfect characteristics of the market make the task of estimating market value of real properties much more difficult than in those markets where there are standard units or products such as stocks or shares. Nonetheless, in order to understand and analyze the housing market, we assume market efficiency.¹⁵

According to a recent study by the United States Securities and Exchange Commission (SEC 2008), when markets are imperfect and inactive, including situations where prices are not so reliable and available, a need arises to reassess existing concepts and approaches in order to make them more pragmatic. However, the currently troubled situation in the global market does not require either the removal of these basic concepts of the market or a prescription for what the market should do or be, but maybe the rehashing and readjusting of some of the fundamental philosophical and, even, political questions.

Even if the market efficiency assumption is valid, it provides only a start for the empirical work of analyzing market values, because the information on the characteristics of the properties as well as the agents should be gathered, organized, and—most importantly—codified with appropriate methods, programs, and equipment. In addition to the general difficulties of the three basic methods in traditional appraisal practice as exposed in the fourth question above, there are different models of price analysis and prediction with a modern approach that face some empirical difficulties related to the functional form of the models, variable specifications, their interactions, etc. (Pace 1995; Anglin and Gencay 1996).

In addition to the market inefficiency and the difficulties in price modeling, there are some natural hazards such as fires, floods, earthquakes, storms, tornadoes, erosion, volcanoes, etc. that can unpredictably change, or even annihilate, land values within a few minutes (Kovacs and Kunreuther 2001). Today, even if we understand better the reasons for some of these events such as earthquakes or flooding, our inability to predict them leaves this an unresolved issue.¹⁶ Increasing environmental anxiety, government regulations, and changes in

consumer behavior are other less predictable factors that might be playing an important role in the determination of land values (Lorenz 2006). Nowadays, private and corporate market participants are more aware of and informed about sustainable development thinking, which becomes part of a new way of investing and assessing risks.

This last section highlights the fact that even if the implications of the previous sections are acknowledged and correctly addressed, we should always be aware of some unpredictable and contextual factors that will prevent us from accurately estimating land values.

Concluding Remarks

To date, most academic works on land value explanation hark back to the traditional models that aim at reflecting a general picture of the phenomenon. It is clear that the goal of these models is not to estimate an accurate market value of each and every parcel of land. However, the general picture they try to portray, using a “top-to-bottom” approach, has become less relevant, especially in the context of contemporary cities where each piece of land is unique.

On reading the extensive literature related to land and land value, it becomes evident that one or more of the *7Wb*'s exposed in this article have been entirely or, often, partially overlooked, possibly leading to disorder and confusion. They are freely treated depending on the particular goals of the studies and the availability of the data. There are usually more details on the focused issue of the analysis; less related *Wb*'s are treated superficially or completely omitted.

The first question (*Wb1*) deserves the most attention from the literature, notably in the empirical studies requiring data specification, but, unfortunately, there are often few details and, mostly, they leave the doors open for speculation. The period of the assessment (*Wb2*) also matters in the framework of empirical studies and authors usually deal with it even if there are some cases with longer periods of time covering multiple years. Where the land is located (*Wb3*) naturally requires attention, but again details depend on what area the authors are interested in. If for example they are developing a new method of measurement (*Wb4*), location-specific attributes (e.g., *distance to CBD*) may be fewer even though the entire territory of a city is

considered. Inversely, when the determinants of the land value are of special interest, usually one method is selected without explanations about the omitted ones. As with the first question (*Wb1*), question *Wb5* suffers seriously from a lack of attention on the theoretical and practical rationales supporting separate land value and valuation. Land price is in fact seen as part of the whole price of the property where attributes are mixed. Regarding question *Wb6*, few studies consider the importance of distinguishing whether the supply or demand participants decide on the observed prices. Finally, question *Wb7* is broader and more disconnected from the land price analyses.

Even if at first glance some of the *7Wb*'s may appear familiar, proper deliberation upon them requires much more attention, and answers will not simply be conjured up easily by crude guesswork or speculation. Although some of these questions are more important than others, they all need to be clearly and precisely addressed, even if only briefly. Indeed, before building impressive models that pretend to explain or measure land value, we should know more about what is really going on (and going into such equations). If we do not explore and clarify these *7Wb*'s, it is doubtful whether we can go further with analysis without missing important details.

Notes

1. The term *omelette* exemplifies the idea of the inseparability of property prices between land and improvements. Ely (1925) and Ratcliff (1950) are behind this thesis from the *Omeletist School* (according to the qualification of Holland 1970 and Lindholm and Lynn 1982). Recently, Hendriks (2005) has added another term: *vase*. Both are inappropriate, because the essence of the solution to the separation problem is not in such physical substances, but rather in the *value* concept which is more appropriate.

2. The Lincoln Institute of Land Policy and the Graaskamp Center for Real Estate provide useful information, accessible at: <http://www.lincolninst.edu/subcenters/land-values/>.

3. There is a large number of conceptual and empirical studies that are more or less related to land value and valuation. To show how accurately the *7Wb*'s are clarified or not, it is useful to consider some of them in this Notes section. They are retained based on their relevance for the land value and valuation issue, with a focus on a particular *Wb*'s.

4. Colwell and Munneke (2009) measure empirically the variations of land value gradients with direction, across the different sectors from Cook

County (Illinois). This study is particularly interesting for putting into evidence some of the ambiguities related to *Wb1*. In general, the authors discuss questions *Wb1* through *Wb4*, without considering *Wb5* to *Wb7*. Even though the categories residential, commercial, and industrial are sometimes considered separately, there is no detail about differences of usages within each category. The natural logarithm of lot area may not be the sole appropriate unit of comparison for all the usages; one might need to consider the size in depth and in frontage where the shape of the lot matters. Considering land transactions from 1986 to 1999 was risky (*Wb2*), especially as the market was dynamic (Guerin 2000). The determinants of land value usually increase with the size of the territory (*Wb3*); however the authors consider only a few of them (railway, open-spaces, airport, and sectors). Isn't there any land in the data close to a highway, river, mountain, school, hospital, church, etc.? To quantify accurately their impacts, details in the data are important methodological issues (*Wb4*). Being less than 100 feet from a railway does not give the same quality of information as a metrical variable measuring each foot of distance. Moreover, the impact of the attributes of a particular location may be significant for single-family usage, but not at all for commercial or industrial usages in which case different attributes may be important. The authors do consider these details, but, as each piece of land is unique, they are important for the accuracy of the results.

5. In property value analysis, we likewise distinguish between a short, an average, and a long period of time, in regard to 1) the investment prospective; 2) the adjustment of land supply; and 3) the impact of land attributes to be perceived by the consumers.

6. To deal with the effect of time on prices, Clapp (1990) considers almost 10,000 transactions, between 1984 and 1987 in Connecticut towns. Price variations due to "pure time effect" are isolated by the means of the assessed values considered in the same equation. These values are supposed to control for all the variations of locational, structural, or neighbourhood characteristics. As the main focus of the study is the time effect (*Wb2*), no particular attention is given to other *Wb*'s, supposing that the city has done the work. But, there are some pending questions related to the time factor. Isn't the city already integrating the time trend in the estimations that are applicable for a cycle of 10 years? The estimated pure time trend in the model is likely to be an average for all the usages in the data, where the impact of time can be different with types of usage and different sectors.

7. Based on this neoclassical Walrasian explanation, we develop, later, a "hedonic approach" stating that consumers don't appreciate a commodity's value in its entire unit configuration; instead, they judge the marginal utility of each attribute constituting the commodity (Lancaster 1966). Hence, starting with Rosen (1974), this allows for the decomposition and explanation of price

differentials of goods, given their multiple attributes (for a detailed literature review, see Sirmans et al. 2005).

8. The socialists of the Chicago school tried to explain these urbanization dynamics through the Concentric, Sector, and Nuclei models. Without getting into the details here (and the multitude of studies and references), the literature adds that there are other important social factors explaining land price differentials, such as income differentials, social standing, neighborhood racial composition, education levels, and the like (Vandell 1995; Ondrich et al. 2001).

9. The questions of to whom the rent of the land is beneficial and upon whom the burden of the property tax falls are classic debates that concern land value from the political point of view. These questions have profoundly divided the opinions of theoreticians. For instance, Léon Walras, Vilfredo Pareto, and Henry George supported the idea that land value is mainly created by public investments in the community; the landowners are, therefore, indebted to society. Thus, they proposed the appropriation of lands by the state, or the application of a special or “single” tax on land. Over the past 40 years, three theories or views have been proposed to describe the economic effects of the different forms of property tax: the Traditional, the New, and the Benefit views. However, according to Cameron (2000), empirical studies to date have not determined which one of these is more appropriate.

10. Cheshire and Sheppard (1995) improve classical urban rent theory by adding location-specific attributes in property price explanations. They provide a conceptual definition of the land (*Wb1*) and underline the importance of *Wb5* by recognizing that land and building form two different bundle sets of characteristics. Although they include a wide range of location-specific attributes in their analysis (*Wb3*), the conceptual definition of the land is not clearly stated. Sometimes land attributes pertain to the neighborhood category; sometimes to location as if they were different, helping only with an understanding of land value. However, the authors clarify the time issue with data only from 1984 when the market was stable (*Wb2*). They chose to use the hedonic function model (*Wb4*), and gave no details on other methods or on questions *Wb6* and *Wb7*.

11. Despite the availability of a systematic collection of land use data, there are some interesting statistics relying mostly on the surveys conducted by individual cities, sometimes available on their Websites (e.g., Ottawa, Canada: www.ottawa.ca/city_services/statistics/counts/land_use/index_en.html). In U.S. and Canadian cities, vacant land constitutes about 20 to 25 percent of the total urban area. Davis and Heathcote (2007) analyzed residential land stock in the U.S. between 1970 and 2002 and found that it decreases (in the case of residential lands under 1–4 unit) at an average annual rate of 0.6 percent. Obviously, these statistics may vary with the methods of collection, the classifications of land use, the consideration (or not) of lands as vacant with

obsolete structures on, etc. Elsewhere, for example in Australia, land prices increased in the context of reduced land supply (UDIA 2008). Some local and state policies may encourage the creation of more compact urban environments (Glaeser and Joseph 2003), leading thus to a decrease in the size of land lots and an increase of their prices (Monk and Whitehead 1996; Glaeser, Gyourko, and Saiz 2008).

12. Guerin (2000) provides insights into the importance of separate land values (*Wb5*) with a practical application in Peterborough (Ontario, Canada), in connection with discussions of other available methods (*Wb4*). He also looks at the time dimension (*Wb2*), but identifies very few land value attributes (*Wb3*), by contrast to a good number of building attributes (*Wb1*). In his equation, he considers that “heavy traffic” affects both land and building values. Isn’t this an externality factor affecting land value more than building value? There is no clarification in his categorization of property attributes. He presents an interesting strategy for separating land’s value through the use of a dichotomous variable on the improved and unimproved lands. However, there are some technical concerns related to that strategy (e.g., the interactions between variables and the instability of constant terms that may contain the part of explanation from the variables of both components). There is no consideration of *Wb6* or *Wb7* in this paper.

13. The use of the hedonic approach can be an interesting area of research to accomplish this task, based on some economic criteria of separation from the literature, for instance, if land or building attributes are: reproducible, destructible, extensible, more or less mobile, substitutable, supply elastic, physical depreciable, etc. These are more valid criteria for the structural attributes that determine a building’s value. They are less applicable to land value specific attributes such as *Proximity to CBD* because, in order to modify land’s value, one cannot reproduce, destroy, extend, or displace this attribute. It is clear that there is a need for a more objective and empirical framework of classification. There is a good corpus of literature that offers solid theoretical guidelines, but there are few empirical demonstrations, usually influenced by the pretext of *difficulty* from the *Omelette School*. For instance, Hendriks (2005) defends the inseparability thesis (*Wb5*) repeating almost the same difficulties with some simple examples from a financial approach (*W4*); other *Wb*’s are omitted.

14. Isakson (1997) highlights the importance of considering buyer and seller characteristics as a proxy variable that may help to improve the accuracy of statistical models. The accessibility to this information is difficult, but he shows that categorical information can be extracted simply from the names of buyers and sellers. This study particularly considers the importance of *Wb6*, but neglects the importance of other *Wbs*. Colwell and Sirmans (1980) and Chicoine (1981) include information about *Wb6*, usually absent in other property price studies.

15. According to Miller and Geltner (2005), the real estate market has become more efficient over the last few decades with the improvements in the accessibility and quantity of more available information. The development and use of Geographic Information Systems (GIS) tools have also enhanced the quality of the available information (Bible and Hsieh 1996).

16. Researchers studying the effects of natural disasters or environmental preoccupations usually focus on the affected area and the type of disasters (e.g., flooding and earthquakes), with an objective to better predict and manage them (Kovacs and Kunreuther 2001). Some offer insights to consider them in land valuation as less common parameters (Zhai and Fukuzono 2003; Brookshire et al. 1985).

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