

REAL ESTATE VALUES AND ENVIRONMENT: A CASE STUDY ON THE EFFECT OF THE ENVIRONMENT ON RESIDENTIAL REAL ESTATE VALUES

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ABSTRACT

This paper surveys the main issues in literature on real estate market and environment. The real estate business is one of the basic economic sectors in the world. However, it is world-wide accepted that the real estate market is affected and formed not only by economic and productive factors, but, also, by various qualitative characteristics of the natural and human environment, in which each real estate activity is performed. The legal framework that provide the specifications and the restrictions that should be followed in cases of proximity to urban green spaces, to water resources, to unusual topography and to possible, future or past, manifestation of natural disasters assure the importance of the above in the real estate market. Moreover, quantitative assessment and results reinforce further their significance. The main aim of this study is to evaluate the effect of the above parameters in the field of real estate, through a detailed literature review both to European and American areas. Conclusively, this study and its results arouse the need for collaboration of all scientific sectors so as to satisfy all needs and include all preferences, in order to develop the real estate market in a sustainable way with respect to the environment- an idea that the majority of scientists and researchers support for all sectors of human activity throughout the last decades.

Key words: Real estate market values, natural and social environment, natural disasters

1. INTRODUCTION

Greece has always been a country where the real estate business was and continues to be one of the most profitable and vivacious economic sectors. There have been performed no previous thorough studies concerning the factors that affect this sector. Therefore, the impact of various environmental attributes to the real estate market values have not been incorporated. This is the main scope of this study, which will try to enlighten the effect of the natural and human environment, as well as the risk of the natural disasters, to residential property market values. The results are the outcome of a detailed research in articles, journals, books and other studies, the combination of which has underlined the variation in the real estate market values in relation to their special characteristics and their position.

At the beginning of this analysis, it is important to mention and clarify certain definitions on the studied factors. According to the Greek Civil Code, real estate is the ground and its component parts. Ground is the piece of land, which fulfills the terms of a bounded area, able to be designed in topographic diagrams. Component parts of a real estate are those which cannot be separated from its main parts without damage (Greek Civil Code). Whether the building area is a building plot in a city or a farm, the real estate can be described as urban real estate, suburban real estate, coastal real estate and rural real estate. The mentioned differentiation is formed due to certain characteristics of each real estate, without the need of a visual contact (Kiohos, 2007). The market value of a real estate is affected by numerous factors, such as its characteristics, its position, its environment, the socioeconomic background of the area, etc. However, the definition of the market value is the estimated price for which the financial element is sold, on the date of the valuation, from a seller to a buyer, between whom there is not any relationship, they have the same informing and they are not in any kind of pressure (TEGoVA).

The organization of land uses is based on three criteria which include economic prosperity, quality of life and quality of environment. Therefore, the environment can strongly influence the real estate business. An obvious example is the impact of environmental amenities (open space or proximity to parks) or environmental disamenities (air pollution, water pollution, or proximity to noxious facilities) on housing prices through capitalization. When two housing units are identical in all respects except an environmental attribute, the unit with the preferred attribute (e.g., better air quality or greater proximity to the park) can be expected to sell for a higher price. That is, the value that individuals place on the improvement in the environmental attribute should get capitalized into the price of the house (Segerson, 2001). Urban and suburban green, lakes, rivers and sea, topography as far as green areas, wetlands and mountain areas are considered to represent the most important influential factors. The benefit from these elements are numerous, some of which are the stabilization of the global and local climate, the decrease of flood events, the enrichment of the ecosystems etc. (Morancho, 2003; Xatzibiros, 2007). On the other hand, risk of natural disasters can certainly influence negatively real estate market values. In this study, five kind of environmental risks- floods, fires, air pollution, noise pollution and electromagnetic fields- will be analyzed as the human factor cannot prevent the rest by any mean (Makropoulos, 2006).

Institutional laws in Greece concerning the management and the protection of the environment in combination with real estates are highly adequate. Regarding urban and suburban green, law 998/79, 1734/87 and 1650/86 describe the limitations and obligations of a real estate owner towards the protection of green spaces

(Xristofilopoulos, 2005; Hellenic Ministry of environment, physical planning& public works, 1987). Law 2971/01, 3199/03 and the Manual of European Law concerns wetlands (Hellenic Ministry of environment, physical planning& public works, 2001; Kiss et al., 1997) and 1577/85 and presidential Decree/25-5-05 are responsible for the areas with special topographic forms (Hellenic Ministry of environment, physical planning & public works, 1985). These institutional laws determine the way real estate should be created and the obligations of their owners towards the protection of the local environment. Lastly, the European Directive 92/43/EEC (Hellenic Ministry of environment, physical planning& public works, 2000) and Water Framework Directive, 2000/60/EC (Journal of European Community, 2000) form the Natura 2000 network, where parts of the Greek state are included.

2. REAL ESTATE AND ENVIRONMENT: RESULTS AND DISCUSSION

In this section, four elements affecting real estate market values are studied. Green spaces, wetlands, topography and environmental risks are the referred factors, which in combination with some socioeconomic data create the background of the real estate business reality.

Variables that commonly affect real estate market, their positive or negative impact, the source of the literature study and the method performed for the assessment are presented in Table 1 and analyzed separately below.

Table 1. Variables and special features forming real estate market values.

explanatory variable	special features	study	increase or decrease in market value	valuation model
	green spaces	Lange et al. 2005	20%	hedonic pricing
	high income area	Kathleen, 2007	10-15%	hedonic pricing
	building clusters with full tree cover	Kathleen, 2007	18%	hedonic pricing
	building clusters with full tree cover, near suburban area	Kathleen, 2007	35%	hedonic pricing
	building plot covered up to 2/3 by green	Kathleen, 2007	37%	hedonic pricing
	distance of 400 meters or a distance of two to three blocks from a park	Kathleen, 2007	10%	hedonic pricing
	existence of a park (not free for the public)	Kathleen, 2007	20%	hedonic pricing
Urban- Suburban green	urban park in a distance of 150 meters	Royal Institution of Chartered Surveyors, 2007	2%	hedonic pricing
	natural park in a distance of 150 meters	Royal Institution of Chartered Surveyors, 2007	19%	hedonic pricing
	park for special uses in a distance of 150 meters	Royal Institution of Chartered Surveyors, 2007	15%	hedonic pricing
	suburban green spaces with forestry view	Royal Institution of Chartered Surveyors, 2007	4,9%	hedonic pricing
	suburban green spaces with distance up to 1km from forestry area	Royal Institution of Chartered Surveyors, 2007	5,9%	hedonic pricing

	lake or river in a distance of 160 meters	Golby et al., 2002	5,9%	hedonic pricing
	lake or river in a distance of 500 meters	Golby et al., 2002	3,5%	hedonic pricing
	lake or river in a distance of 1600 meters	Golby et al., 2002	0,9%	hedonic pricing
Wetlands	high and safe water quality area	Maine Agricultural and Forest Experiment Station, 1996	15%	hedonic pricing
	lake or river in a distance of 0-100 meters for land market values	Golby et al., 2002	27%	hedonic pricing
	lake or river in a distance of 2400 meters for land market values	Golby et al., 2002	0%	hedonic pricing
Topography	less abrupt ground slope	Davies et al., 2008	Increase not measurable	hedonic pricing
	view and peaceful environment in places with high slope	Petty, 1982	Increase not measurable	Step- wise Multiple Regression model
	increase of air quality of just 1%	Carriazo-Osorio, 2001	10%	hedonic pricing
	increase of air quality of just 1% in high income area	Harrison et al., 1978	28,7%	hedonic pricing
	increase of air quality in various high income areas	Harrison et al., 1978	41,5%	hedonic pricing
	proximity to highway	Klein, 2007	(-)8-(-)10 %	hedonic pricing
	proximity to railways	Brinckerhoff, 2001	-6,7%	hedonic pricing
	increase of noise from airports of 1 db	Kaufman et al., 1997	-0,3%	hedonic pricing
Environmental Risks	noise barriers	Julien et al., 2002	10%	Combination of vector analysis and environmental attributes
	fire (alredy occurred)	Loomis, 2004	-15%	hedonic pricing
	at risk from a flood	Yeo, 2004	(-)4-(-)12%	hedonic pricing
	high voltage towers	McDonough, 2003	-10%	questionnaire research
	damage from high voltage towers	Dalaney et al., 1992	-28,60%	questionnaire research
	noise from high voltage towers	Dalaney et al., 1992	-43%	questionnaire research
	health problems from electromagnetic fields	Dalaney et al., 1992	-58%	questionnaire research

10 meters from high voltage powers	Sims, 2002	27%	Empirical research
100 meters from high voltage powers	Sims, 2002	2,7%	Empirical research

2.1. Real estate and urban- suburban green

In general, green spaces increase the market value of properties up to 20% while, at the same time, they increase the commercial value for real estate for commercial use. The importance of green spaces and the positive correlation of their existence in the real estate market values are evident. The combination of well designed and preserved green spaces with a complete urban design can provide improvements in the ecological, economic and social function of a city (Lange et al. 2005).

To begin with, studies concerning trees and residential property market values in nuclear families have proven that the increase can reach up to 10-15 %, when the property is located in an area of high income. The conservation or creation of green spaces (in case of new created regions) or their reformation is performed according to certain standards. Thus building clusters with full tree cover can present an increase in market value up to 18 %, while this percentage increases even further and reaches up to 35 %, in cases of land areas near to suburban green. Moreover, a building plot covered up to 2/3 by green is 37 % more expensive than building plots with no green at all.

Studies have shown that potential buyers are willing to pay high amounts for houses near urban free spaces or green spaces of any size, small or big, such as Central Park in London. It is impressive, that a distance of 400 meters or a distance of two to three blocks from a park, can increase 10 % the market value of properties, while the existence of a park (not free for the public) can lead to an increase in price, up to 20 % (Kathleen, 2007).

Variations are discerned as far as special characteristics of the park are concerned. In a distance of 150 meters, an urban park increases the market value up to 2 %, a natural park up to 19 % and a park for special uses reaches 15,4 % (Royal Institution of Chartered Surveyors, 2007). Combining the characteristics of the park with those of the building, results presented in Table 2 evoke:

Table 2. Variations in market value due to certain building and spatial characteristics

PARKS-OPEN SPACES	DETACHED	FLAT	NON-DETACHED
City Park	19,97 %	7,54 %	2,93 %
Local Park	9,62 %	7,92 %	9,44 %
Open space	2,71 %	4,70 %	0,44 %

Source: Economic Value of Green In fracture, 2008.

In cases of commercial use, values tend to increase 9-12%, if the stores are near an urban green space (Kathleen, 2007). It is worth mentioning, that the distance from the Central Business District does not decrease the value to the same extent, as the age of the building does.

Taking into consideration various socioeconomic factors (families with or without children, income level), it is noted that willingness to pay for a property near urban green is higher for families with children and even higher for families with children and a high income (Thériault et al., 2001).

As far as suburban green spaces and areas nearby forests are concerned, property market values increase up to 4,9 % in average for those with view to a forestry area and decrease up to 5,9 % in average for those, whose distance from such areas increase by 1 km (Tyvainen et al., 2000).

2.2. Real estate and wetlands

Almost in every case, property market values increase as the proximity to the sea shore augments. Its market value is the same regardless of its proximity to the costal line. However, its real current value in the market varies according to its position, its characteristics and the characteristics of the residential wetlands (Lambrou, 2006).

Real estate market values are influenced by the existence of a lake or a river, if they are within a range of 2 km. Specifically, the increase in market value reaches 5,9% for a distance of 160 m, 3,5 % for 500 m and 0,9 % for 1600 m. On the other hand, land market values without the existence of a real estate are increased, having the higher percentage for a distance of 0-100 m (27 %) and are completely eliminated, when reaching a distance of 2,4 km. It is important to mention that potential buyers are reluctant to pay more for a property at a distance of more than 100-150 m, because of the possible existence of a protection framework for the river or lake and their nearby area and, therefore, their obligation towards this protection (Golby, 2002).

Finally, high and safe water quality is an influential factor too, increasing the real estate market values up to 15 % (Michael et al., 1996).

2.3. Real estate and topography

One of the most difficult real estate influential factors to study and define is the topography of the area or else the relief. According to the land category in which the property is located (plain, mountainous), the market value fluctuates respectively.

It is proven that as the ground slope becomes less abrupt, real estate market value increases. The willingness of the buyers to reach the coastal line or the more plain areas constitutes a primary role and affects the properties market value. Of course, this does not prove the absence of disadvantages in properties in plain areas, as these properties might confront problems with floods (Davies et al., 2008).

Finally, there are cases where properties located in places of high slope are more expensive than those in plain areas. The reason for this fact is that in the first case, the property offers a beautiful view and possibly a more peaceful environment to its owners. Especially, if a building plot is divided into smaller ones in order to create more buildings, the view contributes more to the market value formation than does the proximity to the sea shore (Petty, 1982).

2.4. Real estate and environmental risks

Natural disasters are phenomena which can be provoked by the nature without any human intervention. The final outcome of the disaster is measured by the size and force of the natural phenomenon, by how vulnerable is the system which suffers the damage and by its value. The cost of natural disasters in global economy exceeds the amount of 60 billion dollars annually and causes approximately 140.000 deaths.

Environmental risks are phenomena which can be provoked by the nature because of the human intervention. It is widely known that human life and activities affect the course of the environmental life and circle. The effect of the human activities in major cities and their metropolitan areas have augmented in such level that strongly influence the global climate change and the stability of the ecosystems.

The five studied cases belong to the second category. Neither of the other natural disasters are studied as they are not easily measurable (Makropoulos 2006).

2.4.1. Air pollution

It is widely known that air pollution is a frequently appeared phenomena and a major problem in metropolitan cities. Its impact on ecosystem stability and on human health is indisputable worldwide. But as all environmental risks, air quality level has its impact on the economy and more specifically on the real estate business as it influences the willingness of a property acquisition (Jaksh, 1970).

Studies have shown that an increase of air quality of just 1 %, increases land values up to 10 % (Carriazo-Osorio, 2001). In relation to the economic level of the residents, the percentage can reach 28,7 %. Furthermore, this percentage can even reach 41,5 % in various regions.

This fact is enforced by examples of numerous cities where suburban properties, with less air pollutant emissions and a higher-level environment, are much more expensive than properties in the main core of the city (Harrison et al., 1978)

2.4.2. Noise pollution

Noise destruction can be divided into three categories: noise created by public transport, railway noise and airport noise.

Public transport refers to buses, subways, cars etc. Properties in high proximity to highways are 8-10 % cheaper than those in a quiet area (Klein, 2007).

Real estates close or next to railways present a 6,7 % decrease in its market value. It is worth mentioning, though, that the unwillingness of a potential buyer, if only the distance and not the noise is considered, can reduce further the value (Brinckerhoff, 2001).

Even if the majority of the airports are located out of the city areas, the noise still reaches the suburban properties and, therefore, influences their market value. Specifically, an increase in the noise of 1 decibel (db) decreases the value up to 0,3 %. Considering the activities performed in an airport, the decibels are multiple during takeoff and landing of aircrafts (Kaufman et al., 1997).

Noise barriers are very important in all of the above cases as they tend to increase values even up to 10 %. However, the proximity to such infrastructures can decrease market values as they exclude a possible view from a property. A correct combination of these factors can lead to the utmost financial effect on real estates (Julien et al., 2002)

2.4.3. Fires

Fires are a special factor because they have important subsequent as floods. The decrease in property market values can reach 15 % after the occurrence of fire in the area. This fact demonstrates that buyers tend to think about the possibility of a new fire and, consequently, the destruction of their property. Moreover, even if the efforts of rehabilitation are effective, the view from the properties is not the same.

As far as land market values are concerned, the destruction of the nutritious ingredients of the ground by a fire decreases its productivity and, hence, decreases its value (Loomis, 2004).

2.4.4. Floods

Floods are divided into two categories: land flooding and floor flooding. In the following charts, it is clear that flooded properties decrease their value, when properties at risk from a flood reach a decrease up to 4-12 % (Yeo, 2004).

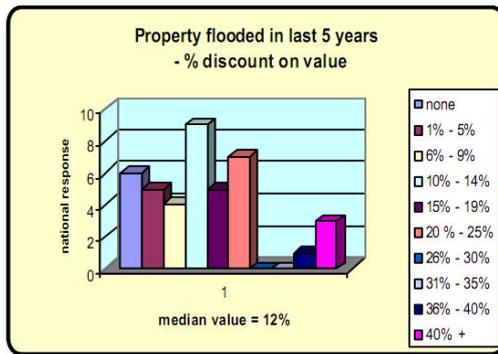


Fig. 1. Decrease in value of flooded properties

Source: RICS Foundation 2004

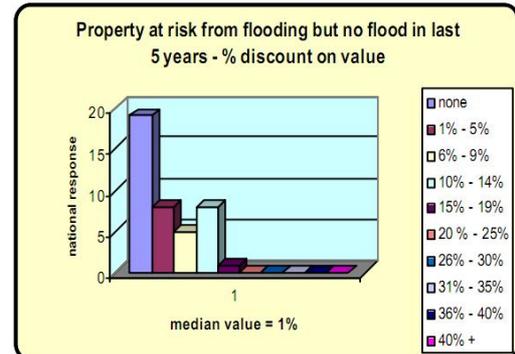


Fig. 2. Decrease in value of properties at risk from floods

Source: RICS Foundation 2004

The fact that the properties have already suffered floods proves that there is a high risk of such an environmental risk to appear again. In Figure 1 a percentage more than 80 % declare that there is actually a discount on value, which reaches the percentage of 10-14 %. More importantly, 30 % of the responses believe that the decrease in value of the properties can overcome the percentage of 40 %, while almost 60 % of the responses believe that floods do not have any impact on the value.

It is crucial to mention that physiological factors (fear, hesitation, preferences, hope etc.) play an important role in Figure 2. While in Figure 1 the fear of suffering floods again is incorporated, Figure 2 shows that the fact that the property has not flooded for, at least, five years has not influenced the value respectively. A fluctuation between 1-14 % discount on the value appears to have won some responses. The properties that have not flooded recently have a decreased value mainly due to the fact that the fear of floods and the expected unwillingness to pay for those properties affect the value strongly than the fact according to which the properties have not been flooded in the last 5 years.

2.4.5. Electromagnetic fields

The emotional factor in the case of property acquisition is very important, especially when examining impacts of electromagnetic fields. It is proven that the existence of high voltage towers cause a decrease of up to 10 % in average (McDonough, 2003).

The view of such infrastructures is not the only reason for the decrease in value. The fear of danger from these towers cause a 28,6 % decrease of the market value, the noise they are creating a 43 % decrease and the possible health problems caused by the electromagnetic fields decrease market values even up to 58 % (Dalaney et al., 1992).

The proximity to these towers increases the values as it gets higher. For example, 10 m. from the base point can cause a decrease of 27 %, but when reaching the 100 m. this percentage decreases to 2,7 % (Sims, 2002).

3 CONCLUSIONS

Through the decades, cities have evolved and changed in a great deal. The relationship between human and nature consisted and still remains the basic influenced factor during every change observed in the structure and organization of the cities. Spatial development includes and is influenced by economical, environmental and social characteristics. One of the affected sectors is the Real Estate Market (Aggelidis, 2000).

In Greece, the real estate business is a new, recent developing sector, compared to other European countries. The institutional laws are sufficient despite the fact that extreme variations of market values exist as if there is no legislative framework. The protection of the environment should be one of the main concern of every management plan and action, as the environmental dimension is obligatory for every measure according to the European Union.

Market values of real estates and land increase in average according to their proximity to urban green and forestry areas. This observation is expected as the positive effect of such areas is proven both in aesthetical level and human health.

The same results are observed as far as riparian areas are concerned. Seas, rivers and lakes stabilize the local climate and elevate the region aesthetically giving a boost to real estate and land market values too.

Restriction for the building ability stand for areas with special topography, because the majority of these areas are located on mountains with forests or specially protected regions. The variations of real estate market values follow an increasing trend inclination in general.

Very interesting are the results on how the market values are influenced by environmental risks. At this point, it is worth mentioning that the emotional composition strongly affects the decision of property acquisition - risk of a natural disaster especially if the area has already suffered from a disaster.

Conclusively, through the existing examples for each element and the observation of the Greek real estate reality, it is obvious that the development of this sector is imperative beyond the determination of simple market or current values. Therefore, in this case, it is mandatory to create complete studies which will determine and enlighten the inclinations according to which the foundations of the real estate market will be based.

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