EUROPEAN SPATIAL RESEARCH AND POLICY
Volume 20 2013 Number 2
https://doi.org/10.2478/esrp-2013-0011

PART II
ARTICLES

Serafeim POLYZOS*, Dionysios MINETOS*

INFORMAL HOUSING IN GREECE: A MULTINOMIAL LOGISTIC REGRESSION ANALYSIS AT THE REGIONAL LEVEL

Abstract: This paper deals with the primary causes of informal housing in Greece as well as the observed differentiations in informal housing patterns across space. The spatial level of analysis is the prefectural administrative level. The results of the multinomial logistic regression analysis indicate that Greek prefectures differ in the way they experience the informal housing phenomenon. An explanation for the observed differences may be the separate development paths followed and the diverse range of economic activities in each prefecture. The Greek state has not made provisions for creating the necessary 'urban land stock' in each prefecture, so that everyone interested can find land parcels at an affordable price. On the contrary, the state encourages the informal housing activity by legalizing large areas of such activity sporadically and by introducing legislative initiatives of limited success in dealing with the problem.
Key words: informal housing, land use changes, multinomial logistic regression, housing policy, Greece.

1. INTRODUCTION

In several countries worldwide, informal settlements represent a growing part of many metropolitan areas. Factors influencing informal housing growth and settlement formation vary amongst locations. In the literature, the investigations dealing with informal housing activity could be classified into two general categories.

* Serafeim POLYZOS, Dionysios MINETOS, Department of Planning and Regional Development, University of Thessaly, Pedion Areos, 38334 Volos, Greece, emails: spolyzos@uth.gr; dminetos@prd.uth.gr

The first category comprises numerous enquires that examine illegal housing phenomenon in less developed or poor countries (Linden *et al.*, 1985; Sethuraman, 1985; Kumar, 1996; Roy, 2005; Smart, 2006; Kapoor and Blanc 2008). In the second category, the attempts on approaching informal housing activity concern developed nations. These studies have been mainly focussed on the role of the state and on policy responses to housing affordability issues (Susser, 1996; Waterson, 1998; Ward and Peters, 2007). Here, informal housing is often considered as 'hidden homelessness', which is admittedly little understood, or systematically studied, though acknowledged as a critical research priority and gap (Tanasescu *et al.*, 2010). This tendency to separately examine illegal housing in developing and developed countries by using distinct approaches is mainly due to the large differences observed in economic, social, political and environmental conditions associated with the countries of each category. Consequently, the proximate and underlying causes of illegal housing phenomenon might be fundamentally different amongst countries. This consideration has impeded our capacity for comparative and more holistic understandings of the processes that give rise to housing illegality (Tanasescu *et al.*, 2010).

The type and quality of buildings may vary considerably between countries (Kombe, 2000, 2005). Estimates based on current trends in the developing regions of the world indicate that such settlements will increase considerably providing shelter for as many as 50% of the total urban population over the next ten–twenty years (UN-Habitat, 2003, 2005). In most countries facing this problem, there is little strategic thinking about the integration of these housing clusters into the city as a whole (Abbott and Douglas, 2003). Therefore, the problem remains unresolved generating serious adverse impacts on almost all aspects of urban life (e.g. transportation, safety, social security etc.).

For Greece, informal housing constitutes a phenomenon with complex and interacting economic, social and political dimensions. It is tightly connected to the kind of management applied by the state upon urban and non-urban land. Past and current housing policies in Greece have introduced specific instruments to address informal settlements. The first targeted informal housing policy, which was launched in 1983, set up two important mechanisms to deal with the problem. However, the illegal housing phenomenon proceeded at a high pace, with about 3,000 unlicensed buildings (almost the size of a small town) being legalized and integrated into the existing urban system each year. Moreover, it is believed that the number of illegal buildings that escape the legalizing process annually is much higher (Minetos *et al.*, 2006; Polyzos and Minetos, 2007).

This situation tends to become an acute problem with serious economic, social and environmental implications. Its significant and pressing impacts include deterioration of landscape aesthetics, biodiversity loss, desertification, forest and open space loss, increased vulnerability of human settlements, local water

contamination. It is vital to understand the informal housing process in order to design and implement effective policy responses.

The present empirical research primarily aims at revealing the major underlying causes of informal housing in Greece performing a spatial analysis of the phenomenon at the prefectural administrative level (NUTS III). The focus of the study is on how certain regional economic, social and environmental characteristics influence the magnitude of informal housing across space. In doing so, we adopt a quantitative approach and construct a logistic regression model of likely explanatory variables. The choice of the variables relays on well-known theoretical perspectives on the fields land economics and housing. The remainder of the article is organized as follows: Section 2 provides a framework for the empirical analysis by dealing with the theoretical perspectives that either directly or indirectly refer to the process of informal housing. Section 3 presents the methodological approach of the study. It also gives a detailed description of the explanatory variables used in the model and comments on the merits of using multinomial logistic regression as a tool for investigating informal housing phenomenon. The overall performance of the model is discussed and the results are presented and interpreted. Finally, Section 4 formulates the conclusions drawn from the precedent investigation.

2. UNDERSTANDING INFORMAL HOUSING PATTERNS

A plethora of theoretical schemata have been developed to explain various land allocation processes. In regards to informal housing, the pertinent literature reports two major categories of theories, which offer a means of conceptualizing reality (Hall and Hay, 1980; Leontidou *et al.*, 2002; Sietchiping, 2004). The main classification criterion of these theories is the level of economic development of the country under question. The first category encompasses theories which apply to the developed countries, whereas the second category comprises theories which can better explain illegal housing patterns in the developing countries (Sietchiping, 2004).

In regards to the developed countries, three general theoretical schemata are frequently discussed in the international literature.

1. The Chicago School perspective which was formulated mainly by Burgess in the late 1920s. He considered illegal housing the result of income level differences among various ethnic groups who competed for urban land (Burgess 1925 in: UN-Habitat, 2003; Sietchiping, 2004). In an updated version of this perspective, Davis (1992) introduces the concept of 'the ecology of fear' which will probably become the natural order of the 21st-century city.

2. The neo-liberal theory of slums of Alonso. This theory suggests that illegal housing is a reaction to the housing needs of the people who cannot afford to pay

for a formal housing unit due to discriminatory urban regulations and public spending (Smith, 1980). However, Leontidou *et al.* (2002) argue that this approach as well as the urban life cycle model (according to which there is a cyclical process of urban changes encompassing the stages of urbanization, suburbanization, disurbanization or counterurbanization and reurbanization), distort the characteristics of Euro-Mediterranean urban development. Therefore, they are inappropriate for analyzing urban patterns in many Mediterranean cities.

3. Two contemporary perspectives on globalization. (a) The post-modern theory of urban landscape, which can be regarded as a continuation of the theory of factorial ecology. In the post-modern theory, informal settlements are perceived as the product of skills segregation within urban spaces and according to this approach, urban dwellers settle in regards to their profession and social status (Flood, 2000). (b) The 'global cities' concept by Sassen (1991, 2003), which refers to cities with resources that enable firms and markets to be global. This author proposed the term 'global city' to describe the impacts of globalization on city structure through the movement of labour and capital, new technologies and firm location decisions.

With regard to Greece, the building forms and driving forces of informal housing have been extraordinarily different depending on the historical context. Informal settlements in Greece are unlike such settlements in poorer countries, where the very poor people have established settlements with whatever materials may be available. The most common housing informality in Greece includes construction mainly of houses without building licenses on small, legally-owned land parcels, in areas having no formal urban plan (Potsiou and Ioannidis, 2006; Dimopoulou and Zentelis, 2008). We can roughly distinguish two periods regarding the evolution of the phenomenon, the areas mainly occurred and the causes which affect its appearance. The first period started in decade of 1950s, after the Second World War and the Civil War in Greece and ended in 1983.

In this period, the 'first generation of informal settlements' grew, while informal housing activity was associated with significant rural – urban migration movements as well as with the failure of the state to meet the widespread demand for shelter by the incoming population. Urbanization and net increases in the country's population created pressing needs for new housing units. In addition, the level of income of the newly-arrived population was relatively low at most major cities and so did their ability of acquiring a proper shelter. Increases in urban population usually fuel the demand for housing in the real estate market rising, in its turn, urban land and property prices. High land prices are a serious obstacle for acquiring a house. Increases in the available developable land through the extension of existing urban plans are a time-consuming process. Therefore, keeping urban land prices at an affordable level is difficult and requires effective monitoring procedures and adequate land use planning mechanisms. So, people coming from rural to cities did not have access to housing financing and they

could not afford to buy apartments in the city. It was affordable for them to buy land parcels mainly in the periphery of major cities or close to industrial areas, and also within the coastal zone, in areas that had no formal urban planning regulations (Potsiou and Ioannidis, 2006).

In the past, under the prevailing tight economic conditions, neither the government nor the private sector could provide the urban poor with basic shelter. Hence, informal housing activity was, in some respects, the direct result of the failure of government housing and spatial planning policies. The main reasons for this failure were: (a) the regional and economic policy pursued which fuelled rural-urban migration movements, (b) failure to design and implement urban land policy that could have provided land plots of affordable prices for the low income groups and (c) the inability of the public sector to plan strategically and to forecast urban land demand (Dimopoulou and Zentelis, 2008; ECE 2008; UN-Habitat, 2010).

The second period of the phenomenon began in 1983 and continues by our days. In 1983, a significant piece of legislation was introduced dealing with wider urban land planning and management issues as well as with the phenomenon of informal housing in Greece (Law, 1337, 1983). The law contained provisions for integrating informal settlements into the existing system of urban areas and for lowering the pace of urban sprawl through the introduction of urban land use zones. By this document, the state attempted to integrate these informal settlements into a legal status by extending the formal urban plans. In particular, the Law 1337 gave priority to the extension of existing town plans in areas on the urban fringe with unauthorized development, lacking basic urban infrastructure and implementing Zones of Urban Development Control (Giannakourou and Balla, 2006; Dimopoulou and Zentelis, 2008). As a result, a great effort was made to survey and organize unregistered urban units that had emerged since the post-war period (especially after 1955 when the Greek state introduced the building license requirement).

These legislative measures so far did not solve the problem of informal housing in Greece. By 1995, most of the 'first generation of informal settlements' had been legalized, but the 'second informal settlement generation' process had already started. Remarkable changes have also occurred in the spatial distribution of informal housing units. Whereas in the past most of the informal settlements were located in suburban areas of the great metropolitan concentrations, nowadays the majority of informal settlements are developed in distant areas of great environmental value, close to the coastal zone or in the islands. Rising living standards in large cities increased the demand for second or holiday home without a equal increase of land parcels' supply, resulting in the phenomenon of illegal housing to be transferred to areas where a wonderful natural environment was ensured. Thus, a reversal of direction for initiating the phenomenon from 'rural – urban' to 'urban – rural' is observed, but it is not eliminated from the urban areas, while in the same time the standard of living in the urban areas was improved.

We can classify the factors that have led and kept the phenomenon of illegal housing in Greece in three basic categories that concern social, economic and environmental causes. One schematic presentation, the individual factors and the interaction between them we can see in figure 1. In this scheme a conceptual framework to guide the exploration of the contemporary driving forces of informal housing in Greece is proposed, the content of which will be analyzed below.

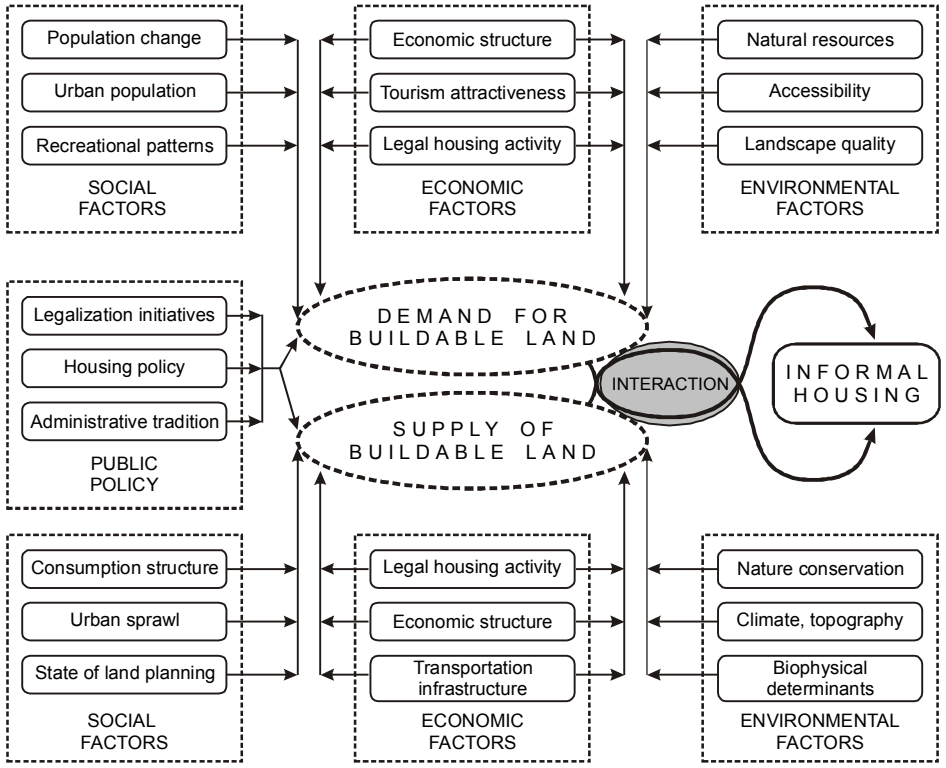


Fig. 1. A conceptual framework of informal housing phenomenon
Source: own elaboration

All categories influence both the supply and the demand of buildable land. In turn, the importance of the interaction between supply and demand determines the individual and collective land development strategies as well as residential land use patterns. Where the supply of land, in terms of quantity and quality, is insufficient in meeting the existing demand, a likely result may be informal housing. In the following, the most important factors that influence both demand and supply of buildable land are presented and the significance of their influence on the magnitude of informal housing in Greece is assessed.

3. MODELLING INFORMAL HOUSING DEVELOPMENT

3.1. Methodology

The quantitative analysis that follows has been based on a number of socio-economic and environmental explanatory variables that draw on the conceptual framework presented before. These are described shortly. This analysis involves evaluating a stock of informal housing units in Greece that entered into the legalization process during the period from 1997 to 2006 against selective economic, social and environmental factor.

1. The total population potential of each prefecture (*pot*). The concept of population potential must be understood as the force or attraction which the region *r* would exert on region *s* in geographical space and shows the influence each region exerts on all other regions or in this sense, it measures the proximity of a region to other regions. For estimating the influence of population on informal housing, we use both the 'direct' or 'self' population potential (*dpot*) and the 'indirect' population potential (*ipot*). The total population potential is a function of a prefecture's permanent population and the distances between the prefecture under investigation and the remaining prefectures and it is provided by the following formula (Clark *et al*., 1969; Keeble *et al.*, 1982; Polyzos and Arampatzis, 2006):

$$(pot)_r = (dpot)_r + (ipot)_r = \frac{M_r}{d_{rr}} + \sum_{s=1}^{n} \frac{M_s}{d_{rs}^b}, \quad (1)$$

where: M_r – a measure of the volume of population 'mass' of prefecture *r*; M_s – a measure of the volume of population 'mass' of prefecture *s*, *s* = 1, 2…, *n*; d_{rr} – the mean intra-prefectural distance of prefecture *r* (either in time or length units); d_{rs} – the distance between region *r* and the other regions *s*; *b* – an exponent which shows the 'friction of distance' between prefecture *r* and prefectures.

2. Population (*pop*) changes in each prefecture. Increases in the local population create new demand for housing and, therefore, influence both legal and informal housing activity in each prefecture. The statistical data used for this variable derive from the NSSG (2004).

3. The share of tertiary (*ter*) sector of the economy in the total production in each prefecture. Prefectures whose economy is based on the tertiary sector are expected to have higher economic growth rates compared to the remaining prefectures (Polyzos and Sofios, 2008); therefore, they would experience increased demand for housing units, because economic growth in Greece is strongly connected with building activity (Dimopoulou and Zentelis, 2008).

4. The urban population variable represents the change in urban population in each prefecture. It is the ratio of urban population in 1991 to the urban population in 2001 (NSSG, 1991, 2001). According to Zelinsky's (1971) rural-urban migration theoretical suggestion, there are certain stages in migration depending on the state that a society is. One of his suggested stages involves the emergence of considerable rural-urban migration, mostly in countries with strong economic development. In this stage, the migrant flows increase considerably the demand for urban space at the expense of other uses. This may have been the case in Greece for the period shortly after the Second World War which was characterized by massive rural-urban migration movements (Leontidou, 1989). As the country gets into the developed stage, we might have the opposite phenomenon of rural-rebound where people seek dwelling in peri-urban or even rural location despite the fact that they work in cities.

5. The length of sandy beaches (*sbeach*) in each prefecture is a measure of the total length of the coastline and to some extent indicates the existence of suitable areas in each prefecture for building vacation and holiday houses. This factor may represent better the potential in each prefecture for tourism development. The existence of extensive scenic coastal locations is a factor of attraction for tourism investments because of the economic benefits traditionally associated with tourism. Data for this variable come from the NSSG (2004).

6. The total area (*area*) added to the existing urban plans (legalized area) in each prefecture for the period 1985–2003. It is hypothesized that if the new areas that are added to the urban plans are equal to or exceed the demand for urban space, urban land in the real estate market will be of an affordable price. This is because there is a direct relationship between city growth boundaries and affordable housing. Therefore, given the availability of developable land in reasonable prices, there would hardly be scope for informal settlement construction if land price is an important determining factor of informal housing. Despite the fact that in Greece considerable experience has been possessed in applying spatial planning regulations or building permits and the existing regulations, records and registration systems offer the necessary tools to prevent informal building activity, the authorities have not been successful in keeping a balance between the demand and supply for buildable land (Dimopoulou and Zentelis, 2008). The statistical data for this factor are taken from the Ministry for Environment, Planning and Public Works (YPEHODE, 2006).

7. Legal housing *per capita* 1990–2000. Legal housing *per capita* is a measure of housing activity in each prefecture. This variable seeks to investigate whether the informal housing activity has an analogous relationship with the legal (licensed) housing activity or if they are uncorrelated. The data for this variable are taken from the NSSG (2005).

8. Urban sprawl. The data for this variable come from the NSSG (1990, 2000) and refer to the percentage of urban land outside the existing urban plans in each

prefecture for the year 2000. The indicator is the ratio of the number of buildings constructed outside the existing urban plans in a prefecture multiplied by 100 to the total number of buildings in that prefecture. This is a proxy variable for total urban sprawl in each prefecture (Minetos and Polyzos, 2010).

9. The nights spent by foreigner tourists in each prefecture (*ftour*) is a proxy variable to capture foreign tourism attractiveness of each prefecture. In turn, this may affect the total demand for accommodation. An additional variable is the nights spent by domestic tourists in each prefecture (*dtour*). This is an indicator of domestic tourism attractiveness of each prefecture as well as of secondary and vacation housing attractiveness (NSSG, 2001).

In order to study the impacts of the aforementioned variables on informal housing activity, multinomial (or polytomous) logistic regression is used which is appropriate when the dependent variable is categorical and the explanatory variables are continuous, or categorical (Norusis, 2004; Lesschen *et al.*, 2005). Multinomial Logistic Regression is useful for situations in which we want to be able to classify subjects based on values of a set of predictor variables. This type of regression is similar to logistic regression, but it is more general because the dependent variable is not restricted to two categories. The logistic regression directly estimates the probability of a certain prefecture experiencing low, medium or high illegal housing activity under the influence of a set of socio-economic and environmental factors. Thus, the technique can be used to present data of illegal housing activity and calculate the coefficients of the mathematical formula.

In this study, legalized housing units per 1,000 residents per prefecture for the period from 1997 to 2006 is taken as dependent variable in the model, using it as a proxy variable for the total illegal housing activity at the prefectural level. For a number of pragmatic reasons, actual illegal housing activity is extremely difficult to observe and count precisely. Therefore, we need an observable variable that can be safely considered as indicative of the magnitude of illegal housing activity. We set up a regression model in which one of the observed variables is a proxy for some unobserved 'true' variable. Therefore, this paper follows the alternative approach of modelling illegal housing as an unobservable variable. In order for the results to be valid, the proxy variable must have a close correlation with the inferred value. Because the legalized housing unit indicator is relatively crude, we choose the multinomial logistic model that performs well when fed with medium or even low quality data.

After transforming the continuous dependent variable into categorical with three classes, two logits are formed. The model is based on the maximum likelihood estimation and not on the least-squares method as in multiple linear regression analysis. The characteristic of multinomial logistic model is that it does not assume a linear relationship between the explanatory variables and the dependent variable (Norusis, 2004). Furthermore, it does not assume homoscedasticity nor that the dependent and independent variables or the error terms are distributed normally.

The only assumptions of the model are that the observations are independent and that the independent variables are linearly related to the logits of the dependent. The benefit of using a multinomial logistic model is that it models the odds of each subcategory relative to a baseline category as a function of covariates. It can test the equality of coefficients even if confounders are different unlike in the case of pair-wise logistics where testing equality of coefficients requires assumptions about confounder effects. Several studies in land use change literature adopted this methodology. Many other scientists (Morita *et al.*, 1997; Newburn *et al.*, 2006) used a multinomial logit model to assess changes in land use by type in various different countries. Multinomial logistic regression is also called 'baseline category', because it compares each class *y* with a reference category, often the first one (category *i*), in order to regress to the binary case.

Instead of using the legalized housing units per prefecture data as a continuous variable we transform it into a categorical variable in order to account for errors, such as undetected informal housing activity in each region and other errors involved in recording the process (Kaimowitz and Angelsen, 1998; Mahapatra and Kant, 2005). The magnitude of legalized housing units per prefecture is used as a dependent variable. Therefore, the following categories of informal housing activities are distinguished in the dependent variable:

Low: prefectures where the value of legalized housing units per 1,000 residents ranges from zero to 2 ($0 \leq$ legalized housing units per 1,000 residents ≤ 2).

Medium: prefectures where the value of legalized housing units per 1,000 residents ranges 2 to 5 ($2 <$ legalized housing units per 1,000 residents < 5).

High: prefectures where the value of legalized housing units per 1,000 residents is from 5 to the maximum value observed ($5 \leq$ legalized housing units per 1,000 residents ≤ 14.2).

The low category is the reference category. The empirical model with *j* categories of dependent variable can be expressed as:

$$\frac{prob(i-class)}{prob(j-class)} = e^{\beta_{i0}} . e^{\beta_{i1}X_1} . e^{\beta_{i2}X_2} \ldots e^{\beta_{in}X_n+\varepsilon_i} = e^{\beta_{i0}+\beta_{i1}X_1+\beta_{i2}X_2+\ldots+\beta_{in}X_n+\varepsilon_i} \quad (2)$$

$$\ln\left[\frac{prob(i-class)}{prob(j-class)}\right] = \beta_{i0} + \beta_{i1}X_1 + \beta_{i2}X_2 + \ldots + \beta_{in}X_n + \varepsilon_i, \quad (3)$$

where: $prob(i - class)$ – the likelihood the dependent variable being in the *i* category; $prob(j - class)$ – the likelihood the dependent variable being in the *j* category (the baseline category); X_n – the explanatory variables 1,…, *n*, employed by the empirical model; β_{i0} – the intercept for logit *i*; β_{in} – the regression coefficient of the variable *n* for logit *i*.

Because the dependent variable has three classes of prefectures, there are two non-redundant logits that can be expressed as following:

$$LogitA = \ln\left[\frac{prob(ILLEGAL-Medium)}{prob(ILLEGAL-Low)}\right] = \beta_{Med0} + \beta_{Med1}X_1 + \ldots + \beta_{Med10}X_{10} + \varepsilon_{Med}, \quad (4)$$

$$LogitB = \ln\left[\frac{prob(ILLEGAL-High)}{prob(ILLEGAL-Low)}\right] = \beta_{High0} + \beta_{High1}X_1 + \ldots + \beta_{High10}X_{10} + \varepsilon_{High} \quad (5)$$

Therefore, the parameter estimates for the above logits are calculated. The quantity to the left of the equal sign is called a logit. It is the log of the odds that an event occurs. The coefficients in the logistic regression model tell us how much the logit changes based on the values of the predictor variables. The first logit expresses the log of the ratio of the probability of a prefecture being in the 'medium illegal housing' category or class compared to being in the baseline category (i.e. low informal housing activity). Similarly, the second logit expresses the log of the ratio of the probability of being in the 'high illegal housing activity' category compared to being in the baseline category (i.e. low informal housing activity).

The histogram of the dependent variable in figure 2 shows that the distribution is not symmetric. There are two peaks on the left hand-side and also the distribution is skewed to the right having a tail towards larger 'illegal housing activity' values. That is why we constructed three categories of illegal housing activity prefectures. The first class represents the prefectures under the first peak that have smaller values of illegal housing activity. The cut point here is 2. The second category represents the prefectures under peak number two having a medium illegal housing activity. The cut-point here is 5. Finally, the last category represents the remaining prefectures of high illegal housing activity under the right tail of the distribution.

Examining the stem-and-leaf plot and the box-plot in figure 3(a) and 3(b) more information about the right tail of the distribution can be obtained. A stemplot or stem-and-leaf plot is a device for presenting quantitative data in a graphical format, similar to a histogram, to assist in visualizing the shape of a distribution and it is a useful tool in exploratory data analysis. Unlike histograms, stemplots retain the original data to at least two significant digits, and put the data in order, thereby easing the move to order-based inference and non-parametric statistics. A basic stemplot contains two columns separated by a vertical line. The left column contains the *stems* and the right column contains the *leaves*. The box plot is a graphical display that simultaneously describes several important features of a data set, such as centre, spread, departure from symmetry and identification of unusual observations or outliers.

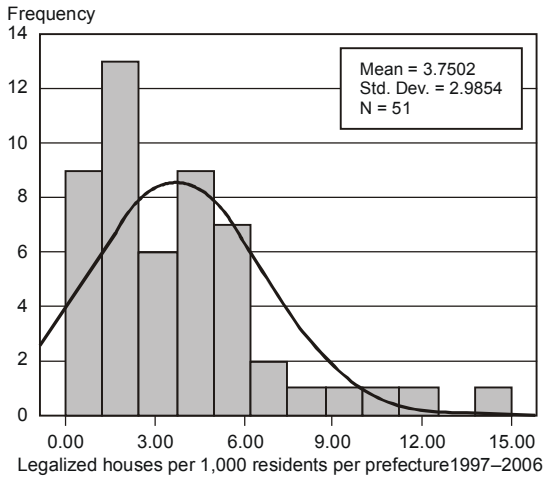


Fig. 2. Histogramic representation of the distribution of the dependent variable
Source: own elaboration

The stem-and-leaf plot shows that there are two prefectures with 7.6 and 8.8 values of illegal housing activity (high values) and 3 outliers lying above 10.9. In the box-plot, the whiskers that extend from the top and bottom of the box represent the smaller and largest values that are not extreme values. The prefectures outside the whiskers are the outliers and they are between 1.5 and 3 box lengths from the edge of the box. These prefectures have the highest illegal housing activity and they are (a) the insular prefecture of Chios (14.17) in the Aegean Sea, (b) the insular prefecture of Euboea (11.95) close to the metropolitan area of Athens and (c) the mainland coastal prefecture of Laconia (10.89) in the south part of Peloponnese.

Fig. 3. Stem-and-leaf plot and box-plot of dependent variable
Source: own elaboration

Figure 4 presents the geographic distribution of informal housing activity for the prefectures classified in the high informal housing activity category. Most of the east coast of the country is designated as high informal housing activity area. There are also two important rings of informal housing activity. The first is located around the great metropolitan area of Athens consisting of the prefectures Euboea, Argolis and Boeotia. The other ring of informal housing activity is located around the second largest metropolitan area of Greece, the city of Thessaloniki. This ring consists of the coastal prefectures of Pieria, Imathia, Chalkidiki and Kavala as well as the hinterland prefecture of Kilkis.

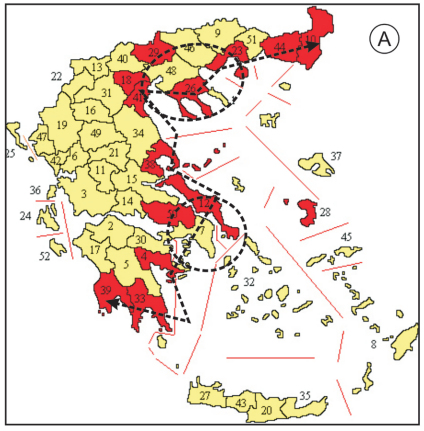
The hypothesis here is that proximity to large urban concentrations results in high informal housing activity in the neighbouring prefectures. Being a coastal prefecture is also an additional significant factor of high informal housing activity.

Figure 5 depicts the geographical distribution of prefectures with medium illegal housing activity. Given the mechanisms of informal housing activity cannot be observed and reliable past data are missing, it cannot be easily determined whether the prefectures on this category are at the risk of climbing to the high category of informal housing activity or at a state that any adverse effect will be less likely in the future. Most of the west coast of the country as well as Peloponnese and Crete belong to this category.

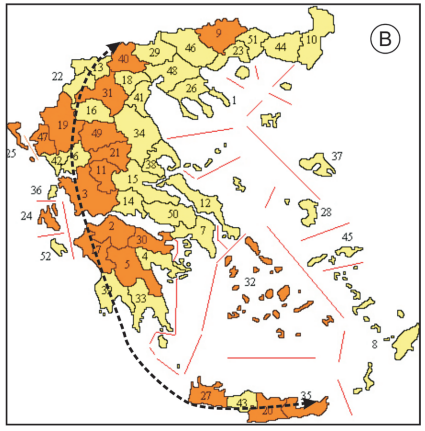
Finally, figure 6 presents the prefectures that belong to the 'low informal housing activity' category. The metropolitan areas of Athens and Thessaloniki belong to this group. In the 1960s and 1970s, these two areas used to be the hot-spots of informal housing activity in Greece. Historically, shortly after the Second World War, there was a rapid increase in migration of rural population to major Greek cities seeking employment or due to political reasons. The flows of new residents towards the cities were of such a magnitude that the state authorities were unable to cope with the demand for residential land (Leontidou, 1995; Maloutas, 2000). The lack of available plots in the central areas of cities meant that the population had to be accommodated elsewhere.

Nowadays, it seems that the pace of informal housing activity has lowered in the periphery of large urban concentrations. The new generations of informal settlements are not the homes of the poor, as they were in the 1960s and 1970s (Potsiou and Ioannidis, 2006), but the result of land speculation activity by an amalgam of actors, such as middle class individual land owners, land investors, building societies, investors in tourism infrastructure and upper and middle class owners of luxury vacation houses. This shows that the informal settlement phenomenon has been transformed from an 'obtaining a shelter' issue to an act of land speculation.

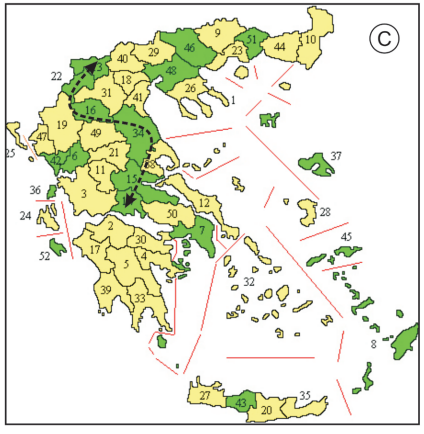
Areas of high informal housing activity. The legalized housing units/1000 residents are between 5.00 and 14.17



Areas of medium informal housing activity. The legalized housing units /1000 residents are between 2.00–5.00



Areas of low informal housing activity. The legalized housing units/1000 residents are between 0.00 and 2.00



1. Mount Athos (a)
2. Achaia
3. Aetolia-Acarnania
4. Argolis
5. Arcadia
6. Arta
7. Attica
8. Dodecanese
9. Drama
10. Evros
11. Evrytania
12. Euboea
13. Florina
14. Phocis
15. Phthiotis
16. Grevena
17. Ilia
18. Imathia
19. Ioannina
20. Heraklion
21. Karditsa
22. Kastoria
23. Kavala
24. Kefalonia
25. Corfu
26. Chalkidiki
27. Chania
28. Chios
29. Kilkis
30. Corinthia
31. Kozani
32. Cyclades
33. Laconia
34. Larissa
35. Lasithi
36. Lefkada
37. Lesbos
38. Magnesia
39. Messenia
40. Pella
41. Pieria
42. Preveza
43. Rethymno
44. Rhodope
45. Samos
46. Serres
47. Thesprotia
48. Thessaloniki
49. Trikala
50. Boeotia
51. Xanthi
52. Zakynthos

(a) This area has been excluded from the analysis

A				B				C			
Athens Ring		**Thessaloniki Ring**		**Aegean Sea and Sea of Crete**		**West Peloponnese & Corinthian Channel**		**The S-shaped line Of Central Greece**		**North and South Aegean Sea and Grete**	
Prefecture	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**
Euboea	11.95	Pieria	8.83	Cyclades	4.29	Achaia	4.61	Larissa	1.92	Lesbos	1.88
Argolis	5.75	Imathia	7.63	Chania	4.24	Arcadia	4.59	Phocis	1.57	Rethymno	1.05
Boeotia	5.09	Chalkidiki	6.72	Heraklion	2.84	Korinthia	4.25	Phthiotis	1.44	Doodecanese	0.51
–	–	Kilkis	5.38	Lasithi	2.41	Ilia	2.40	Kastoria	0.36	Samos	0.09
–	–	Kavala	5.00	–	–	–	–	Grevena	0.16	–	–
–	–	–	–	–	–	–	–	Florina	0.09	–	–
Peloponnese South Coast		**Thessali Coast**		**Ionian Islands**		**West Greece**		**Metropolitan Areas**		**West Greece**	
Prefecture	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**
Laconia	10.89	Magnesia	5.99	Corfu	3.50	Thesprotia	4.42	Thessaloniki	1.85	Preveza	1.25
Messenia	5.06	–	–	Kefalonia	2.53	Ioannina	4.23	Attica	1.18	Arta	1.09
–	–	–	–	–	–	Aetolia-Acarnania	3.98	–	–	–	–
Trace Coast		**Aegean Sea**		**Sterea Ellada and Thessaly**		**Aegean Sea**		**Ionian Islands**		**North Greece**	
Prefecture	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**	**Prefecture**	**Value**
Evros	5.09	Chios	14.17	Trikala	3.57	Kozani	2.74	Lefkada	1.91	Serres	1.99
Rhodope	6.28	–	–	Evrytania	2.56	Drama	2.04	Zakynthos	1.11	Xanthi	1.90
–	–	–	–	Karditsa	2.16	–	–	–	–	–	–

Fig. 4. The geographic distribution of informal housing activity
Source: own elaboration

3.2. Empirical Results

The likelihood-ratio test for the overall model is shown in table 1. This measure tests the null hypothesis that all coefficients in the logistic model are 0. Because the observed significance level is small (0.035), the null hypothesis can be rejected. Therefore, it is concluded that the final model is significantly better than the intercept-only model. The variation in the values of the dependent variable that is explained by the independent variables cannot be measured directly in logistic regression models, as it can be in multiple linear regression ones with R^2. However, the pseudo r-square statistics can provide an indication of explained variation in the values of the dependent variable, similar to the R^2 in multiple linear regression models. These approximations are presented in table 1. Larger pseudo r-square statistics indicate that more of the variation in the values of the dependent variable is explained by the model, to a maximum of 1. The Cox and Snell R^2 and the Negelkerke R^2 are large enough. The Negelkerke R^2 indicates that 54% of the variation in the illegal housing activity is explained by the model. This percentage is satisfactory as the values of logistic regression measures are almost always much smaller than the corresponding ones for a linear model (Norusis, 2005).

Table 1. Case processing summary, model fitting information and pseudo-R^2

Case processing summary				Model fitting information						
		N	Marginal %	Model	Model fitting criteria			Likelihood-ratio tests		
Illegal housing activity	0 = Low	18	35.3		AIC	BIC	-2 log likelihood	chi-square	df	Sig.
	1 = Medium	19	37.3	Intercept only	115.211	119.074	111.211			
	2 = High	14	27.5	Final	126.421	172.784	78.421	32.790	22	0.035
Valid		51	100.0	Pseudo R-square			Goodness-of-fit			
Missing		0						Chi^2	df	Sig.
				Cox and Snell	0.474		Pearson	72.769	78	0.646
Total		51		Nagelkerke	0.535		Deviance	78.421	78	0.465
				McFadden	0.295					

Source: own elaboration.

The null hypothesis that the model adequately fits the data can be examined by the Pearson and Deviance tests in the Goodness-of-fit part of table 1. Because the significance level is much greater that 0.05, the null hypothesis that the model does not adequately fit the data is rejected. The likelihood-ratio tests presented

in table 2 evaluates the contribution of each variable to the model. It is a test for the individual coefficients and tests the hypothesis that the coefficients are 0. The -2 log-likelihood is computed for the reduced model; that is, a model without the variable. If the significance of the test is small (less than 0.05 or 0.10), then the effect contributes to the model. This test can be used instead of Wald test presented in table 4. The Wald test sometimes fails to correctly reject the null hypothesis when coefficients are large. The Wald test performs well with large sample sizes. The significance values of the test for the variables 'total population potential', 'indirect population potential', 'gross domestic product in the tertiary sector', 'percentage of urban population' and 'length of sandy beaches' are lower than 0,05. Therefore, it can be concluded that they are important factors in the formation of illegal housing activity. All other variables have large values of significance (more than 0.10), meaning that they are not important factors. Finally, the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) are measures of how 'good' a model is compared to other models with different number of variables. The model with the smallest value of Akaike criterion or, alternatively, Bayesian criterion is better. As it can be seen, the model that includes all variables has the smallest AIC (123.139) as well as the smallest BIC (165.639).

Table 2. Model fitting criteria and likelihood ratio tests for the individual logistic regression coefficients

Effect	Model fitting criteria			Likelihood ratio tests		
	AIC of reduced model	BIC of reduced model	-2 log likelihood of reduced model	chi-square[a]	df	Sig.
1	2	3	4	5	6	7
Intercept	124.662	167.162	80.662	2.241	2	0.326
Total population potential	131.725	174.225	87.725	9.304	2	0.010
Indirect population potential	129.547	172.047	85.547	7.126	2	0.028
Change in population 1991–2001	124.740	167.240	80.740	2.319	2	0.314
Gross domestic product in the tertiary sector	128.493	170.993	84.493	6.072	2	0.048
Percentage of urban population	129.862	172.362	85.862	7.441	2	0.024
Length of sandy beaches	131.280	173.780	87.280	8.859	2	0.012
Legalized area per 100 residents	125.160	167.660	81.160	2.739	2	0.254
New legal housing area per resident	125.308	167.808	81.308	2.887	2	0.236
Urban sprawl	123.730	166.231	79.730	1.310	2	0.520

Table 2 (cont.)

1	2	3	4	5	6	7
Foreign tourists overnight stays per resident	123.350	165.850	79.350	0.929	2	0.628
Domestic tourists overnight stays per resident	123.139	165.639	79.139	0.719	2	0.698

[a] The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Source: own elaboration.

The classification table 3 shows that the model does very well in identifying the prefectures that experience high illegal housing activity. Almost 65% of them are classified correctly. In addition, the model classifies relatively well the prefectures with low informal housing activity. Approximately 56% of the prefectures are correctly assigned. The model does poorly in identifying prefectures with medium informal housing activity.

Table 3. Classification table

Observed	Predicted			
	1	2	3	Percent correct
1	10	6	2	55.6
2	7	8	4	42.1
3	2	3	9	64.3
Overall Percentage	37.3	33.3	29.4	52.9

Source: own elaboration.

3.3. Discussion and Explanation

The parameter estimates table 4 summarizes the effect of each independent variable for the two logits. The squared ratio of the coefficients to its standard error, squared, equals the Wald statistic. Alternatively, the likelihood-ratio tests can be used for the individual logistic regression coefficients (table 2).

The analysis starts by investigating the type, magnitude and significance of the relationship between current demographic patterns as well as development processes in Greek prefectures and the spatial distribution of informal housing. Among the explanatory variables of the model, 'total population potential'

(TPP) has a negative coefficient for both logits. However, the relationship between TPP and informal housing activity is statistically significant only in the second logits. As mentioned, the TPP is an indicator of population agglomerations in each prefecture and of the total accessibility of each prefecture in relation to the other prefectures. It seems that population agglomerations do not necessarily increase the probability of a prefecture experiencing high informal housing activity. Therefore, the most heavily populated prefectures have less chances of getting informal housing activity. As the analysis of the rest of the variables shows, prefectures with large permanent population choose neighbouring prefectures for the construction of vacation or secondary housing units, which in many cases might be illegal construction. This is probably a kind of rural rebound process where urban populations construct informal settlements in rural areas.

A second population-related variable is 'indirect population potential' (IPP). Its coefficient has a positive sign and it is significant in logit 2 and not significant in logit 1. The effects of the variable are roughly similar in both categories of prefectures, as regards informal housing activity (namely Medium and High). However, the effects are more acute in the High/Low logit. With 1% rise in IPP, the likelihood of a prefecture being in the category of medium informal housing activity increases by a factor of 1.063, whereas being in the category of high informal housing activity increases by a factor of 1.202. Hence, in both categories of prefectures, improved accessibility increases the likelihood of informal housing activity. These results strengthen the initial expectation that the informal housing phenomenon has undergone significant transformations in Greece. Figure 4 indicates that two distinctive rings of informal housing activity have formed around the metropolitan areas of Athens and Thessaloniki.

For further understanding the population-related effects, the variable 'population change' is examined for the 1991–2001 period. The coefficient of the variable has a positive sign for the first logit and a negative one for the second. This means that an increase in population increases the likelihood for a prefecture being in the medium informal housing category than in the low one, but decreases the likelihood of a prefecture being in high informal housing activity category. However, the level of statistical significance is not satisfactory in both logits, which does not allow drawing any firm inferences.

The coefficients of the share of the tertiary sector in the GDP show the relationship between the logits and the level of specialization in the service sector. For both logits, the coefficients are negative, but statistically different from 0 only for the second logits. These results indicate that the specialization of regional economy in the tertiary sector appears to be negatively related to high illegal housing activity. Namely, the prefectures whose economy mainly relies on the service sector do not suffer great informal housing activity, as in other study has pointed out (Dimopoulou and Zentelis, 2008).

Table 4. Parameter estimates

Legalized houses per 1,000 residents per prefecture 1997–2006[a]		B	Std. error	Wald	Sig.	Exp(B)	95% confidence interval for Exp(B)	
							lower bound	upper bound
Logit 1: The probability of having medium informal housing activity to the probability of having low activity	Intercept	-9.059	9.066	0.999	0.318			
	Total population potential	-0.025	0.020	1.655	0.198	0.975	0.938	1.013
	Indirect population potential	0.061	0.047	1.694	0.193	1.063	0.969	1.166
	Change in population 1991–2001	7.138	8.149	0.767	0.381	1258.345	0.000	10869468617
	Gross Domestic Product (GDP) in the tertiary sector	-0.041	0.051	0.650	0.420	0.959	0.868	1.061
	Percentage of urban population	0.042	0.033	1.680	0.195	1.043	0.979	1.112
	Length of sandy beaches	0.482	0.363	1.765	0.184	1.620	0.795	3.299
	Legalized area per 100 residents	0.184	0.239	0.592	0.442	1.202	0.752	1.922
	New legal housing area per resident	0.009	0.079	0.012	0.914	1.009	0.863	1.178
	Urban Sprawl	0.253	0.230	1.212	0.271	1.288	0.821	2.022
	Foreign tourists overnight stays per resident	-0.036	0.067	0.283	0.595	0.965	0.847	1.100
	Domestic tourists overnight stays per resident	0.039	0.634	0.004	0.952	0.962	0.278	3.334

Logit 2: The probability of having high informal housing activity to the probability of having low activity	Intercept	7.468	15.702	0.226	0.634			
	Total population potential	-0.117	0.055	4.539	0.033	0.890	0.799	0.991
	Indirect population potential	0.184	0.083	4.940	0.026	1.202	1.022	1.414
	Change in population 1991–2001	-9.852	14.371	.470	0.493	5.27E-005	3.08E-017	89973224
	Gross domestic product (GDP) in the tertiary sector	-0.173	0.081	4.571	0.033	0.841	0.718	0.986
	Percentage of urban population	0.138	0.060	5.348	0.021	1.148	1.021	1.290
	Length of sandy beaches	1.157	0.474	5.964	0.015	3.180	1.257	8.045
	Legalized area per 100 residents	0.461	0.297	2.419	0.120	1.586	0.887	2.838
	New legal housing area per resident	0.194	0.138	1.974	0.160	1.215	0.926	1.593
	Urban sprawl	0.268	0.320	0.700	0.108	1.307	0.698	2.446
	Foreign tourists overnight stays per resident	0.255	0.376	0.461	0.497	0.775	0.371	1.619
	Domestic tourists overnight stays per resident	0.726	1.001	0.526	0.112	2.067	0.291	14.700

[a] The reference category is ‘low informal housing activity’.
Source: own elaboration.

The coefficient β of 'percentage of urban population' has positive sign in both logits, but it is not statistically different from 0 for the first logit, whereas it is statistically different for the second. This indicates that urbanization is not significantly related to the separation of the medium and low informal housing activity prefectures. However, it appears to be related to high informal housing activity prefectures. Two possible explanations of this outcome is that (a) high urbanization rates in a prefecture induce informal housing activity regarding mainly secondary housing and (b) the magnitude of urbanization influences the real estate market by increasing land prices.

The length of sandy beaches indicates the existence of suitable areas in each prefecture for building vacation and holiday houses. The positive and significant parameter estimate in High/Low logit denotes that there is a positive relationship between natural amenities and informal housing activity. This is reasonable since as the length of sandy beaches increases so does the relative attractiveness of an area for secondary and vacation housing. As regards the Medium/Low logit, even though the relationship is positive, it seems that there does not exist a strong association.

The total land surface added into the existing urban plans for the period 1985–2003 is a measure of the available developable land. For the first logit, the null hypothesis that the coefficient is the zero can not be rejected because of the high significance arising from the *p*-values testing. However, in the second logit, the significance level is below 0.05. This indicates that probability of a prefecture being in the high informal housing category increases by a factor of 1.58 with 1% increase in the legalized area per 100 residents.

From the observed significance index for both logits, the variable of 'new legal housing areas per resident' does not appear to be related to the medium or high level of informal housing activity in relation to the low level because its coefficients are not significantly different from zero. In other words, the construction of new building units for residential use does not seem to halt (or fuel) the phenomenon of informal housing activity.

Urban sprawl shows a positive relationship with the dependent variable in both groups of prefectures. The parameter estimate is not statistically significant in the first logit; it is significant in the second at approximately 10% level of significance. This result leads to the conclusion that in prefectures of 'high informal housing activity' there is an association between the response and the estimated variable. Urban sprawl brings basic infrastructure to ex-urban areas that may attract informal housing.

Foreign tourism shows a negative association with informal housing in both logits. However, the null hypothesis that the coefficient of the variable is significantly different from zero cannot be rejected due to the observed significance

index. Even though we cannot be sure whether there is a negative relation in place or no relation at all, we can say that foreign tourism activity does not seem to produce informal housing activity. A possible explanation of this result relies on the fact that, as the statistical data shows, foreigner tourists usual accommodate in hotels, while domestic tourists use rented rooms, furnished suites etc. Furthermore, the majority of foreigner tourism, that is characterized as mass tourism, is concentrated in some prefectures (Crete, Rhodes, Corfu), in contrast to domestic tourism that is expanded in the whole country (NSSG, 1996).

On the other hand, the domestic tourism variable has a positive relationship with informal housing in both logits, although it is statistically significant only in the second logit at approximately 11% in significance index. The positive relationship can be interpreted that, unlike foreign tourism, the domestic tourism activity fuels illegal housing, because regions that are attractive to domestic tourists are also attractive to illegal housing if this housing mainly concerns vacation and secondary units. This is further justified when bearing in mind that the prefectures of 'high informal housing activity' are situating close to great metropolitan areas and, therefore, they have large indirect population potential.

Following, a further analysis and evaluation of the results concerning some specific variables are carried out in order that more complex or hidden associations can be uncovered. Figure 5(a) shows the box plots of the overnight stays of domestic tourists per resident in relation to the magnitude of informal housing in each prefecture. A box plot displays the three quartiles, the minimum and the maximum of the data on a rectangular box. The box encloses the quartile range with the lower edge at the first quartile, and the upper edge at the third quartile. A line is drawn through the box at the second quartile, which is the 50th percentile or the median. A line extends from each end of the box. The lower whisker is a line from the first quartile to the smallest data point within 1.5 interquartile ranges from, the first quartile. The upper whisker is a line from the third quartile to the largest data point within 1.5 interquartile ranges from the third quartile. The box plots are panelled by the variable 'length of sandy beaches', which has two categories, the first being non coastal areas or areas with small total length of sandy beaches and the second encompassing the areas with large stretches of sandy beaches. The medians of the 'per resident overnight stays by domestic holidaymakers' in non-coastal areas or areas with small sandy beach stretches are around 1, regardless if the area has low, medium or high informal housing activity. However, in prefectures possessing extensive sandy beaches as the number of the 'per resident overnight stays by domestic holidaymakers' increases so does the magnitude of informal housing. Therefore, increased informal housing activity is more likely in coastal or insular areas.

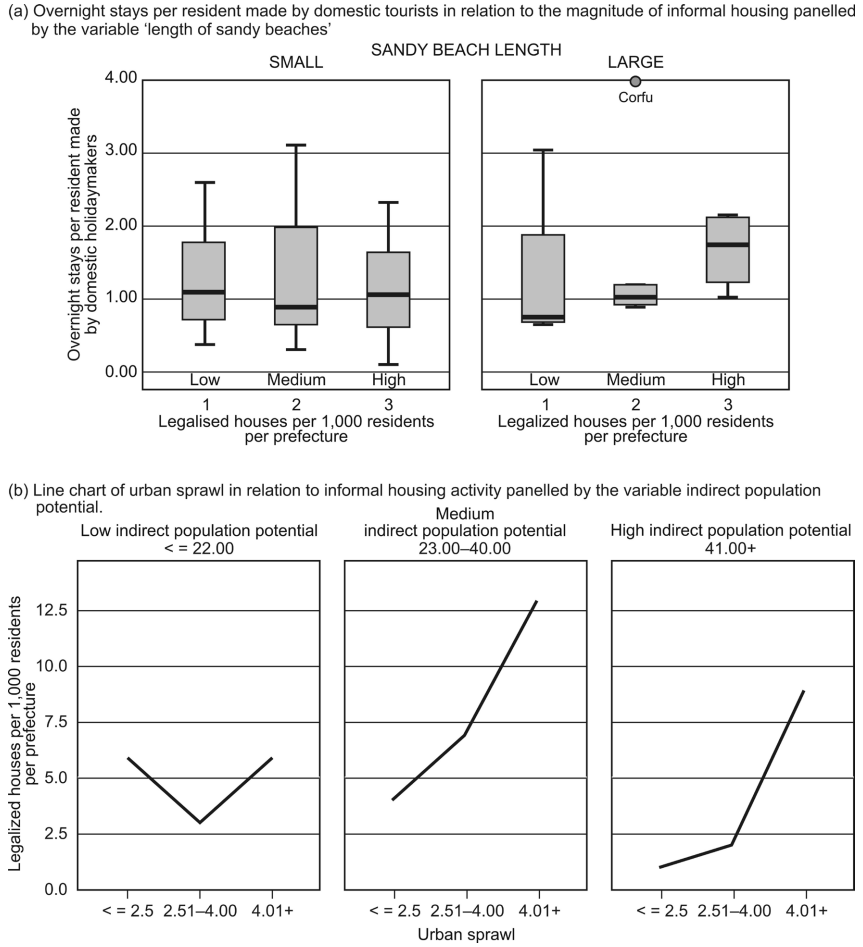


Fig. 5. Hidden associations
Source: own elaboration

Following, a line chart will be made, in order to depict the relationship between 'urban sprawl' and 'indirect population potential', since a line chart works well as a visual summery of categorical values. Figure 5(b) presents a line chart of that relation, which is panelled by the variable IPP. In particular, the prefectures have been classified in three groups in terms of IPP. The first group includes 15 prefectures and refers to areas with low population potential. The second group refers to areas of medium population potential and consists of 24 prefectures. Finally, the third group incorporates the remaining 12 prefectures of high population potential. The first sub-chart indicates that in remote areas with low population potential there is not a clear (positive or negative) relationship between urban sprawl and informal housing. Therefore, in these areas urban sprawl may represent legal construction activity for housing or other purposes.

However, in the other two line sub-charts, a positive relationship appears between the two variables. More specifically, the second and third sub-charts which represent areas with medium and high population potential indicate that informal housing is positively connected to urban sprawl. Furthermore, the magnitude of informal housing activity is larger in medium population potential areas than in high ones as the pace of urban sprawl increases. This also indicates that the initial process of constructing informal housing units in the periphery of large cities during the 1960s and 1970s firstly moved to the neighbouring prefectures and at a second stage diffused further to the prefectures which are at a distance of about 100–150 km from Athens and Thessaloniki.

Figure 6 is an interactive graph consisting of the scatter plot between informal housing activity and urban plan expansion (in km^2) per 100 residents and the box plots of each of the three categories of informal housing. It has been constructed in order to investigate the relationship between informal housing activity and the state policy of expanding the existing urban plans of large and medium size towns and cities in Greece during the period from 1985 to 2003.

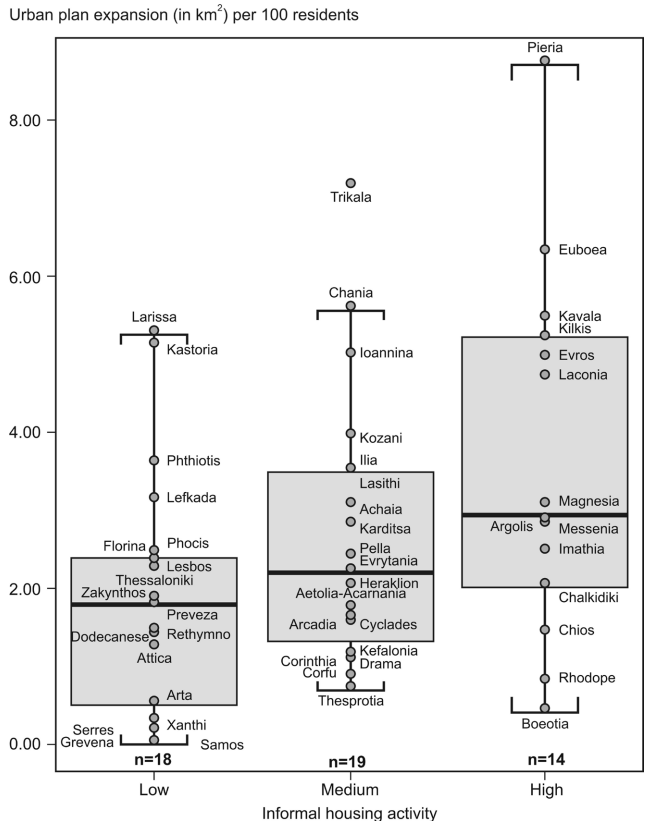


Fig. 6. The relationship between informal housing activity and the urban land policy in Greece
Source: own elaboration

Some obvious differences are immediately apparent. This indicates that as the supply of urban land by the state increases through the incorporation of new areas into the existing urban plans, so does informal housing activity. This seems odd because the provision of new developable land we would expect to lower the pace of informal housing activity. A possible explanation to the above pattern is that the state land planning policy follows informal building activity by legalizing areas of informal housing sporadically without making provisions for creating the necessary 'urban land stock' in each prefecture in time, so that everyone can find land parcels in an affordable price.

4. CONCLUSIONS

Several conclusions can be drawn on the basis of the empirical analysis presented in this paper. First, informal settlements in Greece seem to be different from those in the countries of the Third World as reported by the relevant international literature. The geographic distribution of illegal housing has changed. Whereas in the past, most informal settlements were located in peri-urban areas close to the major urban centres of the country, nowadays their majority develops in distant areas with large indirect population potential, great environmental value, close to the coastal zone or in islands.

Secondly, in spite of the numerous legislative reforms, informal housing continues to develop. For instance, the legalization initiatives of the 1980s and 1990s added considerable land into the existing urban plans and solved pressuring social and environmental problems. However, all these legalizative initiatives as well as the updating and restructuring of building-related procedures and the reform of land use planning policy did not succeed to tackle the problem. In most cases, state intervention regarding the integration of new space into the existing urban plans virtually followed the informal housing process instead of the other way around. Hence, the increase in urban space did not precede but followed the demand already met by the process of illegal housing.

In Greece, the problem of informal settlements that lasts for over eighty years is tightly connected with adopted unrealistic regulations and centralized and mainly bureaucratic procedures in land management. As a result informal housing activity had taken place in all the prefectures, both within planned and non-planned areas, while the intense of the phenomenon is influenced by the determinant factors that have been analyzed in this work. Informal housing in Greece has different characteristics than in other poorer countries, where this building activity is connected with very poor people, and the specific features of Greek informal buildings differ from what has been found elsewhere. So, it is

difficult to be interpreted in the frame of the existence approaches that have been analyzed previously.

In conclusion, the general lesson learned from the above analysis is that informal housing in Greece is a problem coming from the status quo in land market and an irrational situation in land management issues. The state has a responsibility for the applied urban and environmental policy, the illegal housing development and the lack of a central intervention in order to deal with planning development. It should make efforts to improve the situation in land markets through a better land administration system. Containing or eliminating informal housing activity presupposes the formulation of a sustainable, integrated land use policy and the establishment of effective regional and urban land use planning mechanisms. Major issues that need to be tackled include the complex and insufficient legal framework, the inappropriate planning and land use allocation provisions and procedures, the shortage of available well planned and organised land for vacation housing, insufficient control mechanisms, low political will and commitment, and land speculation.

REFERENCES

ABBOTT, J. and DOUGLAS, D. (2003), 'The Use of Longitudinal Spatial Analyses of Informal Settlements in Urban Development Planning', *Development Southern Africa*, 20 (1), pp. 3–19.

DAVIS, M. (1992), *Beyond Blade Runner: Urban Control – The Ecology of Fear*, Westfield: Open Magazine Pamphlet Series.

DIMOPOULOU, E. and ZENTELIS, P. (2008), 'Informal Constructions within a Spatial Development Framework', *Technika Chronika Scientific Journal of the TCG*, 1 (1–2), pp. 57–72.

CLARK, C., WILSON, F. and BRADLEY, J. (1969), 'Industrial Location and Economic Potential in Western Europe', *Regional Studies*, 3 (2), pp. 197–212.

ECONOMIC COMMISSION FOR EUROPE (ECE), (2008), *In Search for Sustainable Solutions for Informal Settlements in the ECE Region: Challenges and Policy Responses*, Geneva: Committee on Housing and Land Management.

FLOOD, J. (2000), 'Sydney Divided: Factorial Ecology Revisited. Residential Differentiation Australian Cities', ANZRSA Annual Meeting, Hobart, September.

GIANNAKOUROU, G. and BALLA, E. (2006), 'Planning Regulation, Property Protection, and Regulatory Takings in the Greek Planning Law', *Washington University Global Studies Law Review*, 5 (3), pp. 535–557.

HALL, P. and HAY, D. (1980), *Growth Centres in the European Urban System*, London: Heineman.

KAIMOWITZ, D. and ANGELSEN, A. (1998), *Economic Models of Tropical Deforestation: A Review*, Jakarta: Centre for International Forestry Research.

KAPOOR, M. and BLANC, D. (2008), 'Measuring Risk on Investment in Informal (Illegal) Housing: Theory and Evidence from Pune, India', *Regional Science and Urban Economics*, 38 (4), pp. 311–329.

KEEBLE, D., OWENS, P. C. and THOMPSON, C. (1982), 'Regional Accessibility and Economic Potential in the European Community', *Regional Studies*, 16 (6), pp. 419–432.

KOMBE, W. J. (2000), 'Regularizing Housing Land Development During The Transition to Market-Led Supply in Tanzania', *Habitat International*, 24 (4), pp. 167–184.

KOMBE, W. J. (2005), 'Land Use Dynamics in Peri-Urban Areas and Their Implications on the Urban Growth and Form: The Case of Dar es Salaam, Tanzania', *Habitat International*, 29 (1), pp. 113–135.

KUMAR, S. (1996), 'Landlordism in Third World Urban Low-Income Settlements: A Case for Further Research', *Urban Studies*, 33 (4–5), pp. 753–782.

LAW 1337 (1983), 'Urban Plans Extension, Urban Development and Relevant Arrangements', *Journal of the Greek Parliament*, FEK-33/A.

LEONTIDOU, L. (1989), *Cities of Silence: Working Class Colonisation of Urban Space, Athens and Pireaus 1909–1940*, Athens: Cultural and Technological Institution of the National Bank of Industrial Development of Greece (ETBA).

LEONTIDOU, L. (1995), 'Repolarization of the Mediterranean: Spanish and Greek Cities in Neo-Liberal Europe', *European Planning Studies*, 3 (2), pp. 155–172.

LEONTIDOU, L., AFOUXENIDIS, A., KOURLIOUROS, E., RONDOS, K. and HATZICHRISTOS, T. (2002), *First Greek Annual Report: Causes of Urban Sprawl in Athens and East Attica. 1981–2001*, Athens: Hellenic Open University.

LESSCHEN, J. P., VERBURG, P. H. and STAAL, S. J. (2005), 'Statistical Methods for Analysing the Spatial Dimension of Changes in Land Use and Farming Systems', Nairobi–Wageningen: LUCC Report Series 7, LUCC Focus 3 Office, ILRI, Wageningen University.

LINDEN, J., MEIJER, E. and NIENTIED, P. (1985), 'Informal Housing in Karachi', *Habitat International*, 9 (4), pp. 289–247.

MAHAPATRA, K. and KANT, S. (2005), 'Tropical Deforestation: A Multinomial Logistic Model and some Country-Specific Policy Prescriptions', *Forest Policy and Economics*, 7 (1), pp. 1–24.

MALOUTAS, T. (2000), *Social and Economic Atlas of Greece*, Volos: EKKE, University of Thessaly Press.

MINETOS, D., POLYZOS, S. and SDROLIAS, L. (2006), 'Social and Public Responsibility and Illegal Urban Land Uses in Greece: An Empirical Investigation', Management of International Business and Economic Systems Conference (MIBLE), Larissa: Department of Business Administration, School of Business and Economics, T.E.I. of Larissa.

MINETOS, D. and POLYZOS, S. (2010), 'Deforestation Processes in Greece: A Spatial Analysis by Using an Ordinal Regression Model', *Forest Policy and Economics*, 12 (6), pp. 457–472.

MORITA, H., HOSHINO, S., KAGATSUME, M. and MIZUNO, K. (1997), *An Application of the Land-Use Change Model for the Japan Case Study Area*, Luxemburg: International Institute for Applied Systems Analysis.

NEWBURN, D. A., BERCK, P. and MERENLENDER, A. M. (2006), 'Habitat and Open Space at Risk of Land-Use Conversion: Targeting Strategies for Land Conservation', *American Journal of Agricultural Economics*, 88 (1), pp. 28–42.

NORUSIS, M. (2004), *SPSS 13, Advanced Statistical Procedures Companion*, Upper Saddle River: Prentice Hall.

NORUSIS, M. (2005), *SPSS 14.0 Statistical Procedures Companion*, Upper Saddle River: Prentice Hall.

NSSG (1990), *Census of Buildings. Hellenic Republic*, Athens.

NSSG (1991), *Population Census. Hellenic Republic*, Athens.

NSSG (1996), *Tourist Statistics. Hellenic Republic*, Athens.

NSSG (2000), *Census of Buildings. Hellenic Republic*, Athens.

NSSG (2001), *Population Census. Hellenic Republic*, Athens.

NSSG (2003), *Statistical Yearbook of Greece. Hellenic Republic*, Piraeus.

NSSG (2004), *Statistical Yearbook of Greece. Hellenic Republic*, Piraeus.

NSSG (2005), *Yearly Data on Construction Activity in Greece. Hellenic Republic*, Piraeus.

POLYZOS, S. and ARAMPATZIS, G. (2006), 'Labour Productivity of Agricultural Sector in Greece: Determinant Factors and Interregional Differences Analysis', *Mediterranean Journal of Economics, Agriculture and Environment*, 1, pp. 58–64.

POLYZOS, S. and MINETOS, D. (2007), 'Causes and Management Implications in the Greek Coastal Zone from Informal Settlements Development', [in:] KUNGOLOS, A., ARAVOSSIS K., KARAGIANNIDIS, A., and SAMARAS, P. (eds.), *Proceedings of the International Conference on Environmental Management, Engineering, Planning, and Economics*, Skiathos, 24–28 June, pp. 727–732.

POLYZOS, S. and SOFIOS, S. (2008), 'Regional Multipliers, Inequalities and Planning in Greece', *South Eastern Europe Journal of Economics*, 6 (1), pp. 75–100.

POTSIOU, C. and IOANNIDIS, C. (2006), 'Informal Settlements in Greece: The Mystery of Missing Information and the Difficulty of Their Integration into a Legal Framework', 5th FIG Regional Conference: Promoting Land Administration and Good Governance, Accra.

ROY, A. (2005), 'Urban Informality: Toward an Epistemology of Planning', *Journal of the American Planning Association*, 71 (2), pp. 147–158.

SASSEN, S. (1991), *The Global City: New York, London, Tokyo*, Princeton: Princeton University Press.

SASSEN, S. (2003), 'Globalization or Denationalization?', *Review of International Political Economy*, 10 (1), pp. 1–22.

SETHURAMAN, S. V. (1985), 'Basic Needs and the Informal Sector: The Case of Low-Income Housing in Developing Countries', *Habitat International*, 9 (314), pp. 299–316.

SIETCHIPING, R. (2004), 'Calibration and Validation of a Proposed Informal Settlement Growth Model', 7th AGILE Conference on Geographic Information Science, Heraklion.

SMART, A. (2001), 'Unruly Places: Urban Governance and the Persistence of Illegality in Hong Kong's Urban Squatter Areas', *American Anthropologist*, 103 (1), pp. 30–44.

SMITH, M. P. (1980), *The City and Social Theory*, Oxford: Basil Blackwell.

SUSSER, I. (1996), 'The Construction of Poverty and Homelessness in US Cities', *Annual Review of Anthropology*, 25, pp. 411–435.

TANASESCU, A., CHUI WING-TAK, E. and SMART, A. (2010), 'Tops and Bottoms: State Tolerance of Illegal Housing in Hong Kong and Calgary', *Habitat International*, 34 (4), pp. 478–484.

UN-HABITAT (2003), *The Challenge of Slums: Global Report on Human Settlements*, London: Earthscan.

UN-HABITAT (2005), *Addressing the Challenge of Slums, Land, Shelter Delivery and the Provision of and Access to Basic Services for all: Overview*, Nairobi: UN-Habitat Regional Office for Africa and Arab States.

UN-HABITAT (2010), *Informal Urban Development in Europe – Experiences from Albania and Greece*, Nairobi: United Nations Human Settlements Programme.

WARD, P. M. and PETERS, P. A. (2007), 'Self-help Housing and Informal Homesteading in Peri-Urban America: Settlement Identification Using Digital Imagery and GIS', *Habitat International*, 31 (2), pp. 205–218.

WATERSON, A. (1998), 'Doing Our Homework: Anthropologists on Homelessness and Housing in the United States', *American Anthropologist*, 100 (1), pp. 188–191.

YPEHODE (2006), Unpublished data on the expantion of urban plans.

ZELINSKY, W. (1971), 'The Hypothesis of the Mobility Transition', *Geographical Review*, 61 (2), pp. 219–249.