# Features and Spatial Analysis of Illegal Housing in Greece

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***Abstract***

*Land use changes in Greece have been the outcome of combining forces with mostly economic, socio-cultural and institutional origin. During the last 50 years, growing demand for urban (residential and industrial) space has resulted in unplanned residential development and illegal dwelling construction to the expense of agricultural and forest land uses. This situation - idiosyncratic to Greece - tents to become an acute problem with serious economic, social and environmental implications. Impacts are great and pressuring ranging from aesthetic deteriorations of landscape qualities, biotic diversity threats, desertification and forest and open land "squeeze" to increased vulnerability to human settlements, local water contamination, as well as to cultural degradation issues. In this article, the above problem is approached in an integrated manner although some emphasis is placed upon its spatial dimension. In particular, by using real data a comparative analysis regarding Greek prefectures is curried out, the most problematic areas are identified and categorized and the major driving forces that fuel the phenomenon of illegal development are described. The article concludes by commenting on likely policy action to be taken in order to contain or eliminate the problem.*

Keywords: illegal housing, urban development, regional development, land use change.

JEL Classification*:* R11, R14, R21, C21

## Introduction

During the last few decades, a rapid and unprecedented transformation of the landscape is under way in almost all over the world. Urban development is consuming land and natural resources at an increasing rate (Geoghegan et al. 1998; Lambin et al. 2001; Polyzos et al. 2008; Wilson and Lindsey 2005) raising serious concerns about the sustainability of current economic growth patterns, the quality of urban space and the state of natural environment (Briassoulis 2000; Walker 2004a). Agricultural land, forests, natural areas and open space are given to urban development and poorly planned (if at all) urban patterns appear threatening the quality of life in numerous ways. Ignoring past and current urban sprawl trends is not sensible, especially when those trends affect the foundations of human social and economic systems. Greece has experienced urban sprawling processes for some decades so far (Leontidou et al. 2001).

Land use changes in Greece have been the outcome of combining forces with mostly economic, socio-cultural and institutional origin (Leontidou et al. 2001; Potsiou and Ioannidis 2006; Xinomilaki-Papaelia 2004). During the last 50 years, growing demand for urban (mostly residential and industrial) space has resulted in unplanned residential development and illegal dwelling construction to the expense of agricultural and forest land uses. This situation, tents to become an acute problem with serious economic, social and environmental implications (Tounta 1998; Xinomilaki-Papaelia 2004). Impacts are great and pressuring ranging from landscape aesthetic deterioration, biotic diversity threats, desertification and forest and open land "squeeze" to increased vulnerability to human settlements, local water contamination, as well as to cultural degradation issues.

Efforts to contain sprawl and revitalize older neighbourhoods through smarter growth practices, legislative initiatives and land use planning schemes have been contentious especially during the last two decades. Around the country, from the large metropolitan concentrations of Athens and Thessaloniki to the smaller rural municipalities, numerous land use planning initiatives have attempted to lower the pace of urban sprawl (Katochianou and Theodori - Markogiannaki 1989)and integrated unlicensed residential constructions to the existing urban system. However, the results of such a policy do not seam to be encouraging. The illegal housing phenomenon proceeds at a high pace, so that about 3.000 unlicensed buildings each year (almost the size of a small town) are legalised and integrated into the existing urban system (NSSG 2000-2005). Moreover, the annual number of illegal buildings that do not get into the legalising process is believed to be much higher (Potsiou and Ioannidis 2006).

Various studies have focused on proposing driving factors and theoretical schemata that underpin and explain the dynamics of illegal housing phenomenon (Costa et al. 1991; Gottdiener 1994; Potsiou and Ioannidis 2006; Tounta 1998; Xinomilaki-Papaelia 2004). However, they are usually descriptive in nature, subjective in their reasoning and most of all they can not stand for complex systems analysis. This article discusses the issue of illegal housing in a quantitative manner employing for this reason correlation analysis. By doing this, we introduce some mathematical precision and objectivity into the analysis of the results and we formulate more coherent conclusions. The concern is on urban patterns that have predominated since the end of World War II. This is because, of a total of about 4.000.000 building in Greece only 600.000 have been constructed before the World War II (NSSG 2000). The great majority of buildings are post-war structures mainly constructed during the 60s, 70s and 80s.

The main aim of the paper is to present the basic features of illegal housing phenomenon in Greece by means of spatial statistical analysis. In that respect we describe and analyze selective driving factors which we think influence decisively illegal housing patterns. Therefore we conduct a further statistical analysis, investigating the relationships between the size of the illegal housing in the Greek prefectures and the determinant factors.

The remainder of the article is organised as follows: Section 2 provides a mental framework for the empirical analysis by dealing with the urban land use theoretical schemata that describe the process of urbanization and that - at least to some extent - provide guidance and

explanations as to why illegal housing practices occur. Section 3 discusses the urban land use planning system in Greece as well as the processes, which have created the present building stock. Section 4 discusses the proximate and underlying causes of illegal housing creation while section 5 is devoted to the spatial analysis of illegal housing and legalisation processes. Finally, section 6 formulates the final conclusions drawn from the precedent investigation.

## Theoretical explanations of informal housing

Recently, informal housing phenomenon has attracted much attention and has also been approached through the concept of "Syndromes of Global Change". It is considered as a major proximate cause of land use change that has been named as the "Favela Syndrome". However, "Favela Syndrome" refers mainly to uncontrolled and unsustainable urbanization processes in developing countries making difficult to explain informal housing in developed economies. Therefore, the study and theoretical explanation of the phenomenon seems to differ considerably between regions with respect to their level prosperity and economic growth.

The emergence of land use patterns have been extensively studied and theorised by scientists of different disciplines (Irwin and Geoghegan 2001; Lambin et al. 2001; Verburg et al. 2004; Walker 2004a). Thus, a plethora of theories have been developed so far in order to provide possible explanations regarding land allocation processes. The relevant international literature (Sietchiping 2004) reports two major categories of theories relevant to the illegal housing phenomenon. The main criterion of classification is the level of economic development of each country. Thus, in the first category belong the theories which apply to the developed countries and cities. This category comprises three theoretical perspectives:

- The Chicago School perspective, which was formulated in the late '20s mainly by Burgess. He considered illegal housing as a result of income level differences of various ethnic groups who competed for urban land.
- The neoclassical economics theoretical schema by Alonso. He suggested that illegal housing was a reaction to the housing needs of the people who cannot afford to pay for a formal housing unit.
- The factorial ecology perspective, which suggests that illegal housing, is the product of professional and social segregation in urban areas.

The second category comprises the theories, which can better explain illegal housing patterns in the developing countries. There are four theoretical schemata in this category:

- The first theoretical perspective suggests that informal housing patterns arise as a result of structural inefficiency found in urban authorities' organisation, poor land management practices and inadequate urban planning schemes.
- The second theoretical view suggests that informal housing patterns are caused due to political, historical factors.
- The third theoretical schema, which applies to countries with economies in transition, proposes that during the process of transformations in the economy deep socio-economic inequalities

arise. As regards the housing sector, these inequalities result in the creation of illegal settlements.
- The final theoretical perspective suggests that the illegal housing phenomenon is a result of the disequilibrium between the demand and supply of urban commodities.

In the section that follows, it is given a selective representation of such theoretical schemata in light of the land allocation mechanism that each theory puts forward as well as the ability that each theoretical schema holds in explaining illegal housing. The purpose of doing this is to connect the underlying factors of illegal housing in Greece used in the analysis, with broader issues regarding economic functioning as well as social behaviour.

**Effective Land Management Perspective**
This theoretical perspective stresses the importance of designing land management policies that result in supplying adequate and affordable buildable space. The planning policies do not start or end with the production of land use allocation maps and drawings. Instead, the theoretical approach suggests that amongst the crucial issues to be considered are: the administrative mechanism in charge of the proposed planning policy, the issue of political stability, corruption matters and quality planning (Leontidou 1993). Lack of taking into account these issues may lead to illegal housing construction.

**Theory of mass consumption**
The theory of mass consumption was employed by Sack in the ‘90 in order to explain contemporary relationships between people and the natural environment. This theory deals with the forms and ethics of social behaviour towards natural environment and states that present patterns of consumption adopted by humans have resulted in generating a chasm between people and the environment (Rappa 2002). Increasing patterns of consumption accelerate the rate of use of natural resources. Therefore, profound land use modifications appear. The high prosperity levels of certain social groups coupled with an insensitive attitude towards the environment (the chasm in human – nature relation) generate illegal housing patterns in the form of secondary or holiday housing. These forms of unlicensed buildings are usually of high quality as opposed to slums in less developed countries and they are frequently materialised into environmentally sensitive areas (coastal zones, forest edges etc).

**Zelinsky’s rural - urban migration theory**
Zelinsky suggested the existence of certain stages in migration according to the state that a society is. One of these stages involves the emergence of considerable rural-urban migration flows. This stage mainly corresponds to the societies experiencing developing processes. During this stage, the migration flows increase considerably the demand for urban space, resulting sometimes to the rapid creation of illegal settlements. This may had been the case in Greece in the period shortly after the World War II. This period was characterised by massive rural-urban migration movements. Following the theory suggests that as the countries get into the developed stage, rural - urban migration may continue but at a reduced rate. In advanced societies people’s mobility continuous but in the form of inter- or intra- urban migration. Technological breakthroughs are expected to reduce this kind of migration. In the developed stage the mass consumption theory seems to fit better in explaining illegal housing construction in the case of Greece.

**Urban land use theory**
In 1960, coherent urban patterns led William Alonso to the formation of «urban land use theory». In his intra-area land use distribution approach, the leading mechanisms behind arising urban spatial patterns around a city's Central Business District are households' attempts - subject to a certain budget - to maintain a given satisfaction level (Leven 1999). Thus, the spatial distribution of land uses depends on households' financial budget and preferences, land parcels distances from the city centre and the location of employment areas. In this respect, land use allocation is close related to the individuals' utility maximization. However, as cities develop, a possible increase in rents may affect the working class. As a result, dwellers who cannot afford to pay for a formal dwelling turn to illegal building construction in the struggle to serve some of their basic needs.

**Theory of the spatial divisions of labour**
In the debate about regional inequality Massey proposed the «theory of the spatial divisions of labour». This theory focuses on the restructuring effects of labour markets and on the spatial division of labour, stressing the re-organization of production (Briassoulis 2000). According to this theory, development accumulates in certain regions as new successive investments are applied and therefore, the needs for urban space scale. The concentration of numerous workers in certain places that they do not have the financial ability of acquiring a legal house induces processes of informal dwelling construction.

The underlying causes of illegal housing phenomenon in Greece have change several times over the year. To fully explain the emergence and the expansion of illegal housing during the last 50 years one must take into account the different historical, political, social and economic contexts. A plethora of explanations and theoretical schemata may be appropriate in different spatiotemporal frames. However, past rural-urban migration patterns, poor urban land planning schemes and regulations, bureaucracy and corruption as well as the ethics of mass consumption era, the social division and the division of labour all seem to have contributed to the illegal housing phenomenon.

## Urban land use planning in Greece

There are important aspects to consider when approaching informal housing phenomenon in Greece. The mass rural exodus of the decades of 50's and 60's mounted demand for urban land mainly in Athens and Thessaloniki. However, the supply of land by the state did manage to meet the existing demand. State urban land use policy was dwarfed and inadequate leading to rapid and uncontrolled peri-urban growth and informal housing construction which was environmentally harmful.

In the last few decades, however, there are significant changes in the characteristics of the phenomenon. The most important qualitative change is that while in the beginning illegal housing units served the low income social classes to shelter, nowadays, the phenomenon is performed by middle and up class individuals. As such, it also tends to change spatially, being an issue of consideration not only in the suburbs of cities but also in remote environmentally sensitive areas like forested area and the coastal zone.

Urban sprawl is usually assumed to refer to the unplanned growth of cities, particularly around their edges or peripheries. This ceaseless conversion of rural to urban and suburban land in light of insufficient land use planning often results in significant negative externalities (Leontidou et al. 2005). Thus, the emerging land use patterns are frequently characterised by the lack of public facilities, poor accessibility to existing facilities in the inner city and low build and environmental quality.

In Greece, the central body for state administration regarding urban policy and planning is the Ministry for the Environment, Physical Planning and Public Works, (YPEHODE). It deals with strategy and policy design, policy implementation issues as well as the necessary amendments to the existing urban planning legal framework. Strategies designed within YPEHODE are been foreword to the Greek Parliament for approval. Sequentially, the strategies are pursued through implementation mechanisms at the prefectural and municipal levels in about 156 Urban Planning Offices, which cover the whole country.

Within YPEHODE, the Directorates of Regional Planning and Environmental Planning are responsible for issues such as planning and management of land resources, spatial structure planning and sustainable spatial development of the country. Special Organisations for Planning and Environmental Protection have been established for the major Metropolitan Areas of the country namely Athens and Thessaloniki. The Ministry, as the main body for handling urban planning policy issues, has launched a broad range of projects over the years to deal with the problem of illegal housing.

In Greece, the turning point for urban planning legislation and illegal settlement construction can be traced back to 1983. In 1983, a significant piece of legislation was introduced for dealing with wider urban land planning and management issues as well as the phenomenon of illegal housing. The law made provision for integrating illegal settlements into the existing urban system and for lowering the pace of urban sprawl through the introduction of urban land use zones. As a result, a great effort was made to survey and organise unregistered urban spatial patterns that had emerged since the post-war period (especially after 1955, a point that the Greek state introduced a certain procedure for constructing a buildings through the requirement for building license). By 1995, most of the «first generation of illegal settlements» had been legalised. However, it had already started the process of creating the «second illegal settlement generation».

In 1997 and 1999 two important legislative initiatives were introduced with the purpose of improving, rationalising and broadening the scope of urban planning system. These were (a) the Sustainable Urban Development Law 2508/97 which provided the necessary guidelines for urban renewal and smart development programmes, housing development as well as secondary and holiday housing planning and (b) the «Spatial Planning and Sustainable Development» Law 2742/1999 which set the framework of land use planning on a national and regional scale. Through the Law 2742, planning is dealt with on (a) a spatial basis (National and Regional Frameworks for Spatial Planning and Sustainable Development) (b) on a sectoral basis (Frameworks for Spatial Planning and Sustainable Development of the Aquaculture Sector, or the Renewable Energy Sector) and (c) on a land category basis (Framework

for Spatial Planning and Sustainable Development of the coastal zone and the mountainous areas).

However, in spite of the aforementioned legislative reforms the informal housing phenomenon continuous to grow. Combining factors and forces such as low political commitment and will, corruption, inadequate administrative structures and failures in the functioning of real estate market seem to have played a decisive role. Blanas (2003) discusses the institutional processes related to loss in equilibrium or asymmetries of information across the politically controlled information domains that pose major obstacles in the improvement of quality processes in the public sector.

## Proximate and underlying causes of informal housing

To describe accurately land use changes and understand well enough the underlying causes of the processes as well as to predict land patterns' composition into the future assisting policy makers in the design of potential interventions, is a complex task. Sustainable land allocation policies seem to require the integration into decision making of all critical aspect involved in the land use change issue (Briassoulis 2000; Geoghegan et al. 1998). A wide variety of approaches and techniques have emerged for this reason, namely to rationalise decision-making about land use matters. How and to what extent existing LUCC techniques have reached satisfactorily this target is also a matter of research. Amongst the various techniques employed in the field of land use change research, statistical methodologies have been widely used for uncovering the dynamics of land patterns formation.

As it was argued earlier in detail, the process of illegal housing is close related to the benefits acquired by individuals and stakeholders involved as well as to the socio-economic characteristics of these individuals. The nature of benefits can be an indicator of the proximate and underlying causes which underpin the phenomenon. For a proper analysis of this complex issue, data requirements are high. Amongst others, there is a need for data concerning the demographic and socio-economic characteristics of the stakeholders involved, the characteristics of the constructed dwellings (use, volume, size) as well as the special characteristics of the areas that receive this kind of development. However, data on informal settlements are scare, discontinuous and of questionable validity (Potsiou and Ioannidis 2006). In Greece, the process of illegal housing has not been monitored in a systematic way. This is a critical issue, which may affect the analysis of the phenomenon, the conclusions drawn upon the analysis and, therefore, the policy proposals and the subsequent technical and institutional solutions put in place for dealing with the problem.

**[Insert Table 1 approximately here]**

An overview of the current research on illegal housing in Greece and elsewhere, allows for identifying the most commonly employed explanatory variable to deal with the problem (Huchzermeyer 2003; Karathanassi et al. 2003; Leontidou et al. 2001; Potsiou and Ioannidis 2006; Sietchiping 2004). Even though there is an extensive literature on illegal housing, one should always bear in mind that the evolution of the phenomenon in Greece has its own particularities. Table 1 gives a selective representation of some proximate and underlying causes

found in the literature, which we expect to be relevant with the course of the phenomenon in Greece.

## Statistical analysis of illegal housing phenomenon

The policy that the Greek state adopted with the purpose of managing the urban land uses can not be characterized as particularly successful. To some respects, the course of illegal housing reflects the way in which the regional problem in Greece has developed. The rapid economic growth of the major urban centres and the parallel economic and demographic shrinkage of the rural, less developed areas, forced an important part of the population to move to the main urban areas. Shortly after the Second World War till the early '80s, the economic and organisational conditions, which had been created encouraged the rapid growth of a few large urban centres (Katochianou and Theodori - Markogiannaki 1989). The urgent and pressuring needs for residential development in the urban areas combined with large population movements from the distant areas and the rural or semi-urban areas to the main urban centres increased dramatically the demand for urban land. However, in that period it was absent the relevant state concern for a well-planned, proportional offer of urban land, so as to compensate the increased demand.

Land speculation phenomena emerged as a consequence of the frontier movement (rural-urban migration), and a large share of land passed from government into private ownership. As a result, there was a great instability in land prices, making urban land inaccessible for the low-income social classes. Virtually the great majority of settlers who moved to the urban areas of Athens and Thessaloniki were to greater or lesser degree speculators. But in a neighbourhood where most of the people live in illegal house, the concept of illegality is meaningless. Spatially speaking, the urban –rural interface and a number of newly formed, informal industrial areas were the first to experience illegal settlements construction processes (the *first generation of illegal houses*). «The poor, and other minorities, who did not have access to housing financing could not afford to buy apartments in the city; moreover they could not afford to buy and develop land within the urban centres in accordance with formal urban regulations; and they could not afford to rent apartments since rental rates exceeded their earning ability» (Potsiou and Ioannidis 2006).

Another important illegal housing category that mainly emerged in the mid '80s was that of secondary housing and vacation residences. These housing units were usually constructed on the coastal zone or close to other kinds of recreational destinations (e.g mountainous areas, wetlands, forests e.t.c). This kind of illegal housing is still growing across the country although formal data are difficult to obtain as they are dispersed amongst some 156 municipal planning offices. In this particular case of high-quality illegal housing, the social classes that choose a legally prohibited attitude are in the middle or higher income levels. On the one hand, the lack of a proper policy for providing suitable land to serve this kind of high quality housing demand and on the other hand, the environmentally - insensitive social ethics of the mass consumption era, are driving a «new generation of illegal settlements». Potsiou and Ioannidis (2006) suggest that during the period 1945-1966 about 380,000 informal settlements were created in Greece. According to Costa et. al. (1991)the total number of illegal constructions in Athens, as of 1984, was 150,000 units. The Ministry for the Environment, Physical Planning

and Public Works, (YPEHODE) which deals with the urban planning legal framework has attempted to legalize illegal houses by expanding the urban plans. Since 1983, the confrontation of the illegal housing problem and the organisation of these areas in order to become functional urban units with networks, technical as well as social infrastructure, has resulted in the integration of some 60,000 ha into the urban land use system (Xinomilaki-Papaelia 2004).

Following, we attempt a spatial, quantitative analysis of the illegal housing phenomenon in Greece, using the existing statistical data acquired by official sources and relevant studies. The methodology adopted is correlation analysis concerning illegal housing and a number of relevant explanatory variables. The scale of analysis is that of the prefectural administrative level. By performing correlation analysis in the sub-national or even sub-regional scale we can investigate possible relationships between the illegal housing patterns and the explanatory variables and at the same time to maintain a certain level of spatial explicitness. In addition to estimating the correlation coefficients, there are also constructed certain diagrams for improved supervision of phenomenon and better understanding.

Diagram 1 depicts the number of illegal houses per 1000 people, which were legalised during the period 2000-2005 in a prefectural level (i.e. the new generation of illegal houses). It also presents the legalized areas per 100 people during the period 1985-2003 in the prefectural level as well. This diagram was constructed by using statistical data acquired by the Ministry for the Environment, Physical Planning and Public Works, (YPEHODE 2006) and the National Statistical Service of Greece (NSSG 2000-2005). By analysing diagram 1, it can be drawn that there are important differences amongst the Greek prefectures concerning both intensity of illegal housing phenomenon and courses of legalized areas. However, it is apparent that as more areas get incorporated into the urban plans in the period 1983-2003, the illegal housing activity increases. The medians of the boxplots show that as the state legalises extensive informal housing areas by incorporating them into the urban plans, people construct more illegal housing units because they possibly expect to get them legalised in the future.

**[Insert Diagram 1 approximately here]**

Diagram 2 is an alternative presentation of the relationship between the number of illegal houses per capita and the legalized areas per capita in each prefecture. This scatter plot and the results of the curve estimation procedure (table 2) both imply a linear relationship between the number of illegal houses and the quantity of legalized areas. The level of statistical significance for coefficient *b1* is 0,011. In some respects, this means the state policy regarding the integration of new space into the urban plans virtually follows the illegal housing process instead of going before. Thus, as it was mentioned before, the increase in urban space does not precede but follows the demand already met by the process of illegal housing.

**[Insert Diagram 2 approximately here]**

**[Insert Table 2 approximately here]**

Another interesting observation drawn from diagram 2 is the fact that the informal housing phenomenon continuous with an increasing pace in the prefectures that have already had extensive areas legalised. It is worth mentioning that the great majority areas were legalized during the period 1985-1995. However, in the prefectures with high figures of legalized areas per capita, illegal housing continuous uninterrupted. This leads to two suggestions: (a) The legalized areas integrated into the urban system were not sufficient in meeting the existing demand for urban land and (b) The state control and monitoring were ineffectual.

Following, they are also estimated in a pair-wise manner the correlations between on the one hand the «Legalized areas per 1000 inhabitants» for the period 1985-2003 as well as the «Illegal houses per 1000 inhabitants» constructed during the period 1995-2005 and, on the other hand, some selective indicators which capture the economic and social characteristics of each Greek prefecture. High correlation values in a statistically significant level show the influence of different regional characteristics to the intensity of illegal housing and to the amount of legalized areas.

The indicators used for the estimation of the aforementioned correlations are:

1. **Population quality.** The term «quality of population» refers to the general characteristics of human capital in each prefecture and it is related to aspects such as the level of education and the professional skills and specialization of the labour force. In this study, we investigate whether or not this variable influences the illegal housing phenomenon. Additionally, the social characteristics of the population are also looked upon in order to find possible connections with the illegal housing phenomenon. As regards population quality, the data used in the estimations are taken from a study by Polyzos and Arambatzis (2006).
2. **Population changes during the periods 1981-91 and 1991-2001**. Changes in population can be use as a measure of new housing needs in each prefecture. Hence, we investigate if there is any relationship between on the one hand, an increase in the size of population in each prefecture during the periods 1981-1991 and 1991-2001 and on the other hand, the magnitude of illegal housing and legalized areas. The data for this variable are taken by the National Statistical Service of Greece (NSSG 2003).
3. **Change in urban population in the period 1991-2001.** Finally, the study investigates if there is a relationship between on the one hand the illegal housing variable and on the other hand, the changes in urban population in each prefecture. In this case we assume that illegal housing concerns mainly the urban population and is close related to the enlargement of cities. Data for this variable are taken by the National Statistical Service of Greece (NSSG 2003).
4. **Rate of urban population.** As it was mentioned before, illegal housing could be considered as the results of the pressure coming from urban growth processes and the concurrent shortage in urban land for city expansion. By investigating the relationship between on the one hand, the number of illegal houses as well as the amount of legalised areas and on the other hand the level of urban population in each prefecture, it is possible to identify whether the illegal housing phenomenon

characterizes the prefectures with high levels of urban population or is independent on this variable. The data for this variable are taken by the National Statistical Service of Greece (NSSG 2003).

5. **Level of prosperity in each prefecture**. By using this variable we investigate whether the level of human prosperity in each prefecture is connected with illegal housing or the illegal housing phenomenon does not depend on the level of economic development of each prefecture. We investigate the correlation values, bearing in mind that high values of growth and prosperity ensure corresponding levels of housing activity. The data concerning this variable were acquired from a study by Petrakos and Polyzos(2005).
6. **Specialization in the primary, secondary and tertiary economic sectors.** The estimation of the potential relationship between illegal housing and sectoral economic specialization in each prefecture, allows investigating whether or not the economic character of each prefecture influences the illegal housing phenomenon. The data for this variable are taken by NSSG (NSSG 2003).
7. **Legal housing per capita 1980-2000.** Legal housing per capita is a measure of the housing activity in each prefecture. If there is a positive and analogous relationship between legal and illegal housing activity, then illegal housing can be interpreted as to whether or not there is the required amount of land to put in urban use. The data for this variable are taken by the National Statistical Service of Greece (NSSG 1980-2000).
8. **Indirect and total population potential.** The «indirect population potential» shows the accessibility of each prefecture to large urban centres. Inhabitants of large urban concentrations may sometime build illegal houses in adjacent prefectures. This tendency is known as secondary and/or vacation housing and happens across the country in many instance (e.g. dwellers from Thessaloniki build houses in Pieria or Chalkidiki, dwellers from Athens in Evia, or Korinthia). The total population potential incorporates the indirect and the direct population potential and shows the total accessibility of each prefecture. The total (TPP) and the indirect population potential (IPP) are indicators of population agglomerations in each prefecture and of the total accessibility of each prefecture in relation to the other prefectures. These two figures are estimated by using the following formulas $TPP_i = P_j / d_{ii} + IPP_i$ or $TPP_i = P_j / d_{ii} + \sum_j^n (P_j / d_{ij})$, where $P_i$ is the population of prefecture i and $d_{ij}$ represents the distances between the prefectures i and j (Polyzos and Arambatzis 2006).

The results of the estimations are presented in the table 3. Most of the results do not verify our initial expectations. Firstly, we can observe that the statistical significance of the results is low in most of the cases. Secondly, the correlations between, on the one hand the illegal houses and the legalised areas and on the other hand the variables «specialization in the tertiary sector», «level of prosperity», «population changes in years 1991 to 2001» and «urban population changes in years 1991 to 2001» are negative. The remaining variables present positive correlations. The variables «indirect population potential» and «changes in population during the period 1981 to 1991» are statistically significant.

A general appraisal of these results leads us to the conclusion that the illegal housing phenomenon in Greece is inconsistent and odd. For instance, the increase in the size of population during the period 1991-2001, the increase of urban population and the level of prosperity have a negative relationship with the number of illegal houses. This may shows that certain increases in the size of total population and the size of urban population do not necessarily lead to illegal housing. The existence of a positive and statistically significant relationship between illegal housing and «indirect population potential» leads to the conclusion that the residents of great urban centres may construct illegal buildings in neighbouring prefectures. We observe relatively low values of illegal housing in Attiki and Thessaloniki and highest values in the prefectures of Evia, Magnisia, Imathia, Pieria and Chalkidiki.

**[Insert Table 3 approximately here]**

However, it should be mentioned that the data about illegal housing units concern the period 2000-2005 and hence, they refer to the second generation of illegal housing. It is highly possible that most of this housing activity concerns secondary and vacation residential units.

Next, we attempt to investigate the kind of relationships between illegal housing and the factors abovementioned. In doing so, we treat illegal housing as a depended variable and then we estimate the relationship with each independent variable separately for 11 deferent regression models (table 4).

**[Insert Table 4 approximately here]**

We sustain the model with the lowest value of statistical significance for coefficient *b* and we also present the related plots. The results of the estimation are shown in table 5.

For the indicator of prosperity a quadratic relationship seems more relevant although the level of statistical significance is not satisfactory. As we can see in diagram 3 (1), the regions with very low and very high prosperity level present low informal housing activity whereas the areas with medium prosperity have high informal housing activity. If we bear in mind that most of the regions with medium prosperity level are in a developing stage competing with each others, it seem that regional developing processes in Greece might be associated with increased informal construction practices. Therefore, the sustainability of current patterns of regional development in Greece seems questionable.

Indirect population potential has a linear, positive and statistically significant relationship with informal housing (see also figure 3 (2)). This may means that the areas which are easily accessible from large urban concentrations are now the subject of informal housing activity rather than the suburban areas. Spatially speaking, the phenomenon seems to further diffuse from the peri-urban space to the greater periphery of the major cities.

The most relevant model to depict the relationship between population quality indicator and informal housing is the power function model although the relationship is not statistically significant. For the

models assessed and the time period examined, it did not appear a significant association between the two variables.

**[Insert Table 5 approximately here]**

The logistic function distribution is more appropriate to depict the kind of relation between the variables "rate of urban population" and "informal housing". However, because the value of significance level is above 0.10 we cannot conclude safely whether there is an actual association in place. Diagram 3(4) shows that the values for Athens and Thessaloniki have a considerable influence on the slope of the curve. If we had excluded these values from the analysis the slope of the curve and the statistical significance of the relation might have been different. Therefore, it seems that there may be a threshold below which rate of urbanisation matters. In particular, there might be a relationship between the rate of urbanisation and informal housing in areas with medium sized cities and not in areas with large urban concentrations. Again the phenomenon seems to have moved to the greater periphery of metropolitan areas.

The *S* function distribution fitted better as regards the variable "specialisation in the Primary sector". The statistical significance is 0.12 which relatively close to the conventional 0.10. It seems that in places where the specialisation in the primary sector is very low possibly because they are already urbanised there is little scope for informal housing. As the regional economy increases its primary sector component enters in an area with greater potential for land use changes and informal housing becomes directly proportional to that potential. However, there is a second inflection point beyond which the more specialisation in the primary sector leads to less informal housing. Those regions are highly specialised in the primary sector, have lower prosperity levels and there is also little scope for investment in new economic activities.

The chosen models for the variables "Specialisation in the Secondary Sector" and "Specialisation in the Tertiary Sector" are the linear and logistic ones respectively. Both are not statistically significant but the logistic model of the Tertiary sector seems to perform better having 0.127 *p* value. It shows a negative association between informal housing and specialisation in the tertiary sector in region where the economy in highly specialised. However, in areas with medium specialisation in the tertiary sector, informal housing is high. Bearing in mind the result concerning the primary sector, we can say that there is a friction coefficient between the specialisation of the regional economy and informal housing.

The most relevant model to depict the relationship between legal housing activity and informal housing is the logistic function model but the relationship is not statistically significant.

The *S* function distribution fits and the coefficient is negative and statistically significant for total population potential in respect to informal housing. Again there are three regions in which the direction of the relationship between the variables changes. When the total population potential is low the informal housing activity is high. As the total population increase the illegal housing is steel high but in diminishing mode. There is a critical point after which further increase in population potential is negatively associated with informal housing.

Finally, as regards the three remaining population variables, the change in population in the period 1981-1991 is described by an exponential model and the relevant coefficient is positive and statistically significant, the change in population in the period 1991-2001 is described by an logarithmic but the relevant coefficient is not statistically significant and the change in urban population in the period 1991-2001 is described by an linear but the relevant coefficient is not statistically significant. Therefore, after the ’90, population changes did not seem to have had a considerable effect on informal housing. However, population changes in the ’80 seem to have had a role in the magnitude of informal housing.

**[Insert Diagram 3 approximately here]**

## Conclusions

Future directions for confronting informal housing are needed. The phenomenon is complex and diverse whereas its formation and magnitude depended on various factors. At the regional level, the relationships between informal housing and regional economic, social and demographic characteristics are mostly nonlinear. Therefore, it is difficult to analyze, depict and be certain of their direction and strength. Informal housing in Greece constitutes a phenomenon with economic, social and sometimes political dimensions. It is tightly connected to the kind of management placed upon urban and non-urban land uses by the state and the implemented housing policy. The economic dimension mainly concerns the need for having provided residence of an affordable price to the low income working classes that came to the cities in search of employment during the transformation of the economy in the post-war period.

In a similar way, the social dimension - especially shortly after the Second World War - was connected to the social need for providing for one of the basic requirement namely «shelter». The political dimension concerns the state planning efforts to legalise informal settlements. In most of the times the state policy regarding the integration of new space into the existing urban plans virtually followed the illegal housing process instead of going before. Hence the increase in urban space did not precede but followed the demand already met by the process of illegal housing. The second generation of illegal housing units shows that the process still goes on. Therefore, it can be said that the state has not managed to formulate a firm national planning land policy to deal with the problem. Instead, the state intervention has been spatially selective and temporally behindhand. The fact that most of the initiatives of legalising informal housing units are still lunched usually just before election announcements shows that there is not real political will and commitment to deal with the problem.

Finally, as far as the management of land uses is concerned, the state have not made provisions for creating the necessary «urban land stock» in each prefecture, so that everyone interested can find land parcels in an affordable price. Instead, the state action follows the illegal building activity by legalising areas sporadically and by introducing new legislative initiatives of limited success in dealing with the problem. It is hence necessary to formulate an integrated, dynamic and informed policy for dealing with the problem. In this respect a fundamental step would be considering the following:

- Extend our knowledge and understanding of the causes of observed variability and change of the phenomenon.
- Search for early insights of proximate and underlying cause as well as go deeper into the clusters of elements that give rise to certain driving forces.
- Reduce scientific uncertainties regarding the proximate and underlying causes.
- Look into the structure of underlying causes and improve policy decision capabilities to serve regional planning needs.
- Improve quantification of the forces causing informal housing activity.
- Reduce uncertainty of how the phenomenon might change in the future
- Prepare scientific syntheses and assessments to support informed discussions on informal housing variability issues by decision-makers.

## References


Blanas, G., Total Quality Networking: TQM - HRM and IS networks, 2003, Patakis Publications, Athens

Briassoulis, H. (2000), 'Analysis of land use change: Theoretical and modeling approaches in: The web book of regional science, http://www.rri.wvu.edu/WebBook/Briassoulis/contents.htm'.

Costa, Frank, Noble, Allen, and Pendleton, Glenna (1991), 'Evolving Planning Systems in Madrid, Rome, and Athens', *GeoJournal,* 24 (3), 293-303.

Geoghegan, J., et al. (1998), 'Socializing the Pixel and Pixelizing the Social in Land-Use and Land-Cover Change', in Diana Liverman, et al. (eds.), *People and Pixels. Linking remote sensing and social science* (Washington D.C: National Academy Press), 51-69.

Gottdiener, Mark (1994), *The Social Production of Urban Space* (Texas University of Texas Press) 340.

Huchzermeyer, Marie (2003), 'A Legacy of Control? The Capital Subsidy for Housing, and Informal Settlement Intervention in South Africa', *International Journal of Urban and Regional Research,* 27 (3), 591-612

Irwin, E. G. and Geoghegan, J. (2001), 'Theory, data, methods: Developing spatially explicit economic models of land use change', *Agriculture, Ecosystems and Environment,* 1764, 1-18.

Karathanassi, V., Iossifidis, Ch, and Rokos, D. (2003), 'Remote sensing methods and techniques as a tool for the implementation of environmental legislation. The Greek Forest Law case study', *International Journal of Remote Sensing,* 24 (1), 39-51.

Katochianou, D and Theodori - Markogiannaki, E (1989), *The Greek system of urban centers*, ed. KEPE (athens: KEPE ).

Lambin, E. F., et al. (2001), 'The causes of land-use and land-cover change: Moving beyond the myths', *Global Environmental Change,* 11 (4), 261-69.

Leontidou, Lila (1993), 'Postmodernism and the City: Mediterranean Versions', *Urban Studies,* 30 (6), 949-65.

Leontidou, Lila, Donnan, Hastings, and Afouxenidis, Alex (2005), 'Exclusion and Difference along the EU Border: Social and Cultural Markers, Spatialities and Mappings', *International Journal of Urban and Regional Research,* 29 (2), 389-407.

Leontidou, Lila, et al. (2001), *First Greek Annual Report: Causes of Urban Sprawl in Athens & East Attica, 1981-2001* (Hellenic Open University).

Leven, Charlie (1999), 'Obituary: William Alonso 1933-1999', *Urban Studies,* 36 (8), 1427-30.

NSSG (1980-2000), 'Building Activity Statistics'.

--- (2000), *Census of buildings*, ed. National Statistical Service of Greece (Athens: Hellenic Republic).

--- (2000-2005), *Yearly Data on Construction Activity in Greece*, ed. National Statistical Service of Greece (Athens: Hellenic Republic).

--- (2003), *Statistical Yearbook of Greece* (Athens).

Petrakos, G and Polyzos, S (2005), 'Regional Inequalities in Greece: Literature Review and Estimations of Inequalities', in M Chletsos, C Kollias, and H Naxakis (eds.), *Studies in Greek Economy* (1; Athens: Patakis), 185-216.

Polyzos, S and Arambatzis, G (2006), 'Labour productivity of agricultural sector in Greece: determinant factors and interregional differences analysis', *Mediterranean Journal of Economics, Agriculture and Environment,* 1, 58-64.

Polyzos, S, et al. (2008), 'An overview of urban-rural land use interactions in Greece', *International Journal of Agricultural Resources, Governance and Ecology,* ((forthcoming)).

Potsiou, Ch and Ioannidis, Ch (2006), 'Informal Settlements in Greece: The Mystery of Missing Information and the Difficulty of Their Integration into a Legal Framework', paper given at 5th FIG Regional Conference: Promoting Land Administration and Good Governance, Accra, Ghana.

Rappa, Antonio (2002), *Modernity & Consumption* (Singapore: World Scientific) 200.

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

Tounta, Fotini (1998), 'Settlement development in the periurban forests of Attica', *Technika Chronika,* II (1-2), 41-53.

Verburg, P. H., et al. (2004), 'Land use change modelling: Current practice and research priorities', *GeoJournal,* 61 (4), 309-24.

Walker, R. (2004a), 'Theorizing land-cover and land-use change: The case of tropical deforestation', *International Regional Science Review,* 27 (3), 247-70.

Wilson, J. S. and Lindsey, G. H. (2005), 'Socioeconomic correlates and environmental impacts of urban development in a central Indiana landscape', *Journal of Urban Planning and Development,* 131 (3), 159-69.

Xinomilaki-Papaelia, Eleftheria (2004), 'Informal constructions and process after the introduction of the new Act 3212/03', paper given at Planning applications and building construction, Athens, 20-21 May.

YPEHODE (2006), 'Statistical data for the number of illegal houses and legalized areas in the Greek prefectures, unpublished data', (YPEHODE ).

# APPENDIX

**Table 1: Classification of Proximate and Underlying Causes of Informal Housing Units**

| Economic Factors | Administrative Factors | Demographic Factors | Socio-Political Factors |
|---|---|---|---|
| Capital Investments | Shortage of available urban land | Age composition of the population | Housing policy |
| Transportation Infrastructure | Low security in land tenure | Ratio of Urban to Rural Population | Low quality of the environmental conditions in the CBD |
| Sectoral Composition | Inappropriate planning and land use allocation provisions and procedures | Household composition | Corruption |
| Prosperity levels | Poor Governance | Educational levels | Land speculation |
| Cost of housing | Complex and insufficient legal framework | Migration fluxes | Consumption Patterns & Lifestyle |
| Real Estate Market – Land prices | Bureaucracy | Population changes | Human behaviour |
| Informal economy | Insufficient control mechanisms | | Historical socioeconomic facts and events |
| Labour Market Structure | | | Low quality of the environmental conditions in the CBD |
| Taxes and subsidies | | | |
| | | | |

**Table 2: Model Summary and Parameter Estimates of Curve Estimation**

| Equation | Model Summary | | | | | Parameter Estimates | |
|---|---|---|---|---|---|---|---|
| | R Square | F | df1 | df2 | Sig. | Constant | b1 |
| Linear | ,124 | 6,963 | 1 | 49 | ,011 | 1,291 | ,034 |

Dependent Variable: Informal Housing Units per 1000 residents
The independent variable is Legalized Areas per 100 residents.

**Table 3: Correlation coefficients between illegal housing, legalized areas and regional economic and social characteristics**

| | Level of prosperity | Indirect population potential | Population "quality" | Rate of urban population |
|---|---|---|---|---|
| Illegal houses/1000 residents | -0,057 *(0,690)* | **0,378**** *(0,006)* | 0,061 *(0,669)* | 0,106 *(0,461)* |
| Legalized areas / 1000 residents | -0,040 *(0,778)* | 0,169 *(0,135)* | 0,107 *(0,454)* | 0,146 *(0,308)* |

| | Specialization in primary sector | Specialization in secondary sector | Specialization in tertiary sector | Legal housing per capita 1980-2000 |
|---|---|---|---|---|
| Illegal houses/1000 residents | 0,054 *(0,706)* | 0,114 *(0,425)* | -0,163 *(0,253)* | 0,073 *(0,612)* |
| Legalized areas / 1000 residents | 0,116 *(0,416)* | 0,045 *(0,756)* | -0,194 *(0,172)* | 0,070 *(0,625)* |

| | Total population potential | Change of population 1981-1991 | Change of population 1991-2001 | Change of urban population 1991-2001 |
|---|---|---|---|---|
| Illegal houses/1000 residents | 0,020 *(0,887)* | **0,193*** *(0,094)* | -0,126 *(0,379)* | -0,198 *(0,163)* |
| Legalized areas / 1000 residents | 0,007 *(0,961)* | 0,003 *(0,981)* | -0,064 *(0,656)* | -0,047 *(0,754)* |

*correlation is significant at the 0.05 level (2-tailed),
**correlation is significant at the 0.01 level (2-tailed).

**Table 4: Regression models used in the analysis**

| Type of Relations Investigated | Equations | Symbology |
|---|---|---|
| Linear | $y = \beta_0 + \beta_1 X$ | $\beta_0$ = a constant |
| Logarithmic | $y = \beta_0 + \beta_1 \ln(X)$ | $\beta_n$ = regression coefficient |
| Inverse | $y = \beta_0 + \frac{\beta_1}{X}$ | X = independent variable or time value |
| Quadratic | $y = \beta_0 + \beta_1 X + \beta_2 X^2$ | ln = the natural logarithm |
| Cubic | $y = \beta_0 + \beta_1 X + \beta_2 X^2 + \beta_3 X^3$ | |
| Compound | $y = \beta_0 \beta_1^X$ | |
| Power | $y = \beta_0 X^{\beta_1}$ | |
| S | $y = e^{\beta_0 + \frac{\beta_1}{X}}$ | |
| Growth | $y = e^{\beta_0 + \beta_1 X}$ | |
| Exponential | $y = \beta_0 e^{\beta_1 X}$ | |
| Logistic | $y = \left( \frac{1}{u} + \beta_0 \beta_1^X \right)_{-1}$ | u = upper bound value for Logistic |

**Table 5: Curve Estimation Summary and Parameter Estimates**

| *Equation* | *Model Summary* | | | | | *Parameter Estimates* | | |
|---|---|---|---|---|---|---|---|---|
| | R Square | F | df1 | df2 | Sig. | Constant | b1 | b2 |
| | **Synthetic Indicator of Prosperity** | | | | | | | |
| Quadratic | 0.062 | 1.595 | 2 | 48 | 0.213 | -0.965 | 0.199 | -0.003 |
| | **Indirect Population Potential** | | | | | | | |
| Linear | 0.143 | 8.148 | 1 | 49 | 0.006 | 1.069 | 0.035 | |
| | **Population Quality** | | | | | | | |
| Power | 0.016 | 0.788 | 1 | 49 | 0.379 | 0.003 | 1.411 | |
| | **Rate of Urban Population** | | | | | | | |
| Logistic | 0.035 | 1.799 | 1 | 49 | 0.186 | 1.043 | 0.989 | |
| | **Specialization in the Primary Sector** | | | | | | | |
| S | 0.048 | 2.495 | 1 | 49 | 0.121 | 0.667 | -6.274 | |
| | **Specialization in the Secondary Sector** | | | | | | | |
| Linear | 0.013 | 0.648 | 1 | 49 | 0.425 | 1.709 | 0.021 | |
| | **Specialization in the Tertiary Sector** | | | | | | | |
| Logistic | 0.047 | 2.404 | 1 | 49 | 0.127 | 0.221 | 1.023 | |
| | **Legal Housing Activity** | | | | | | | |
| Logistic | 0.012 | 0.578 | 1 | 49 | 0.451 | 1.269 | 0.996 | |
| | **Total Population Potential** | | | | | | | |
| S | 0.131 | 7.382 | 1 | 49 | 0.009 | 1.092 | -36.747 | |
| | **Change in Population 1981-1991** | | | | | | | |
| Exponential | 0.039 | 1.997 | 1 | 49 | 0.164 | 0.009 | 4.768 | |
| | **Change in Population 1991-2001** | | | | | | | |
| Logarithmic | 0.016 | 0.794 | 1 | 49 | 0.377 | 2.465 | -4.002 | |
| | **Change in Urban Population 1991-2001** | | | | | | | |
| Linear | 0.039 | 2.009 | 1 | 49 | 0.163 | 2.541 | -0.028 | |

Dependent Variable: Informal Housing Units per 1000 residents

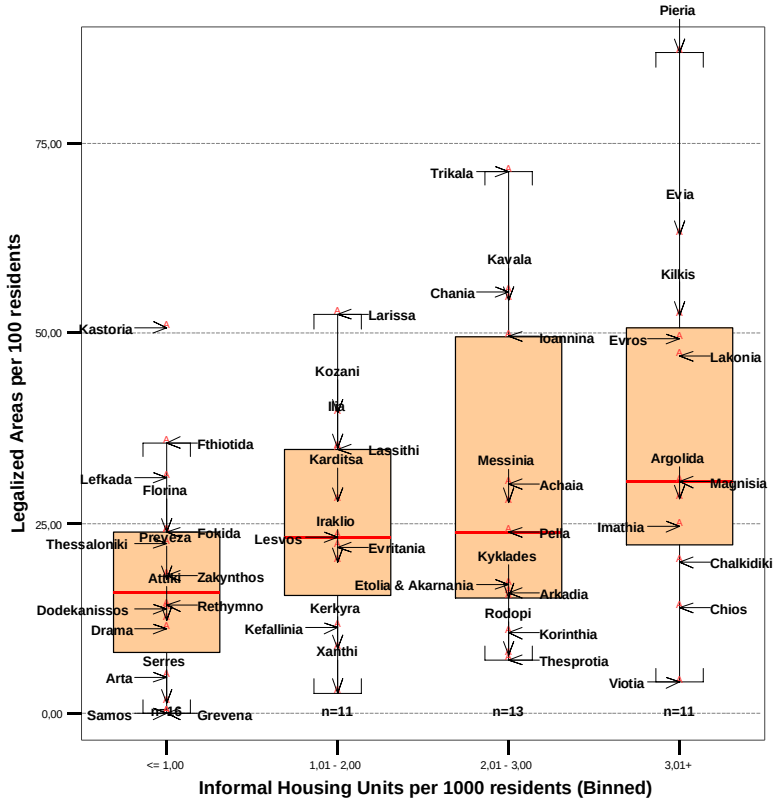



**Diagram 1: Informal houses and legalized areas in Greece**

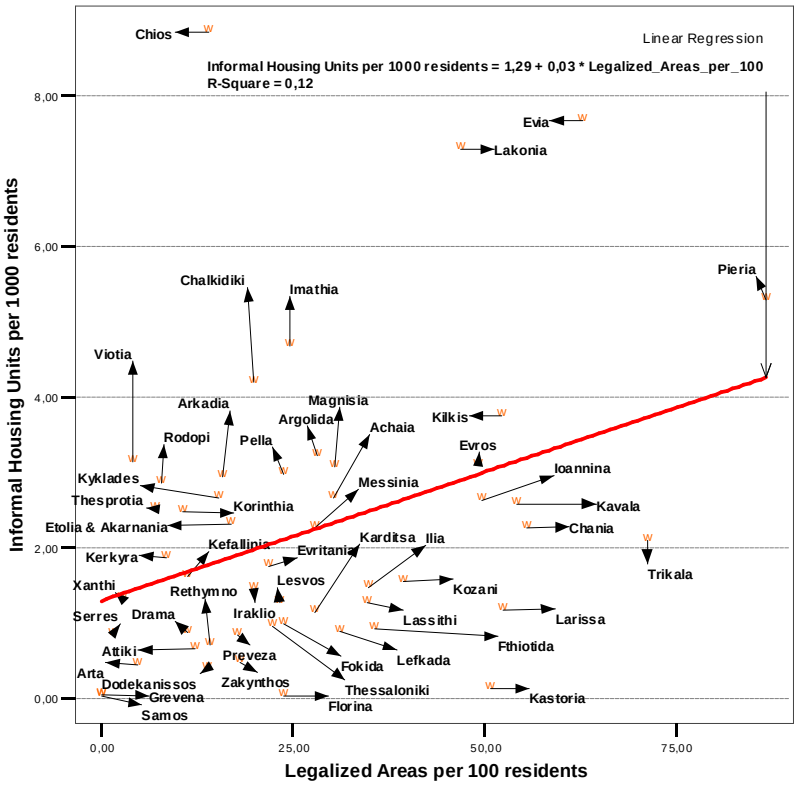
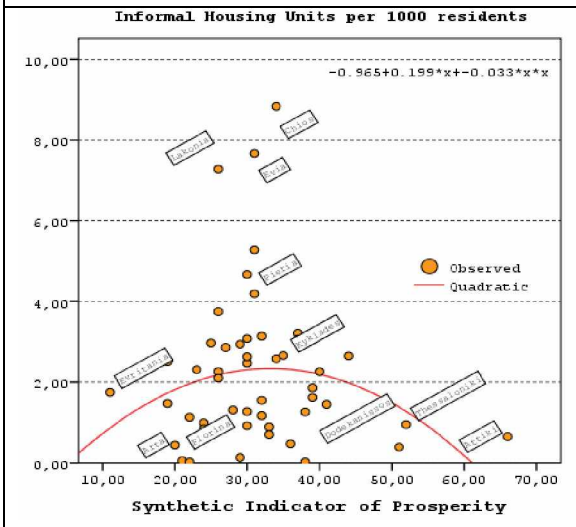
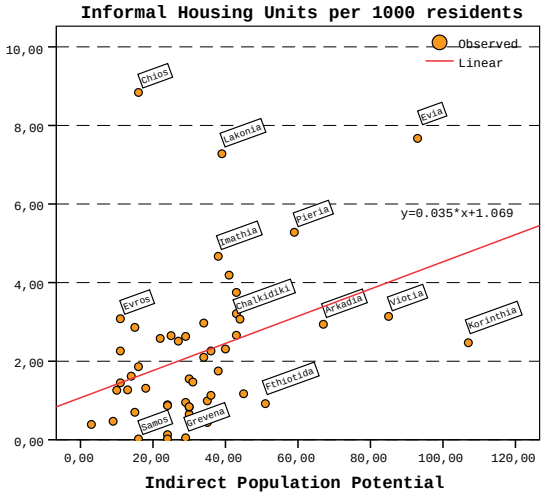


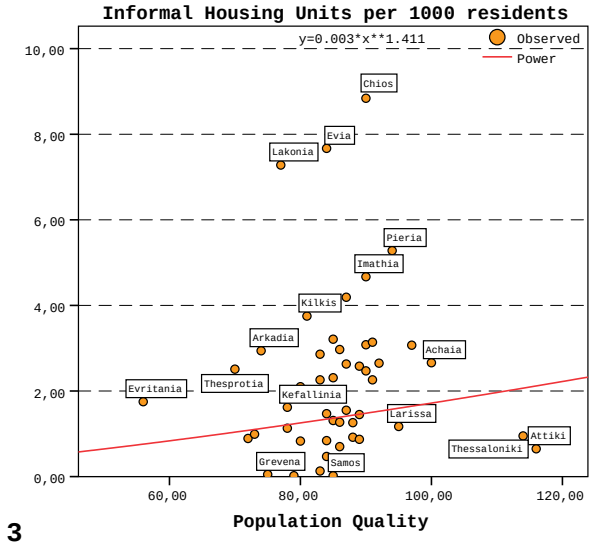

**Diagram 2: The relationship between illegal houses and legalized areas**


Informal Housing Units per 1000 residents
-0.965+0.199*x+-0.033*x*x
Observed
Quadratic
Synthetic Indicator of Prosperity

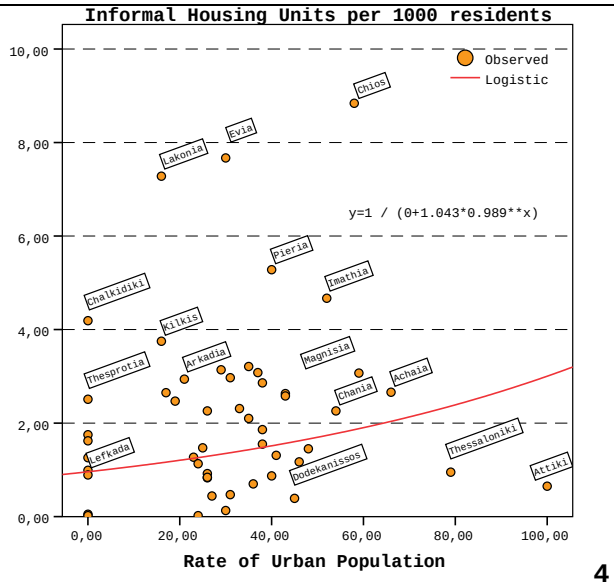
1


Informal Housing Units per 1000 residents
Observed
Linear
y=0.035*x+1.069
Indirect Population Potential

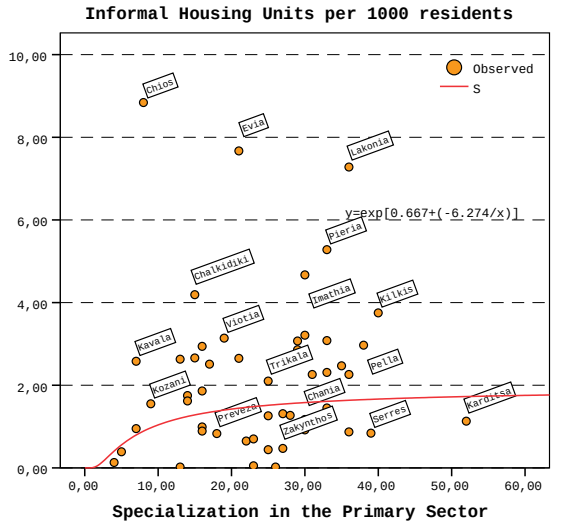
2


Informal Housing Units per 1000 residents
y=0.003*x**1.411
Observed
Power
Population Quality

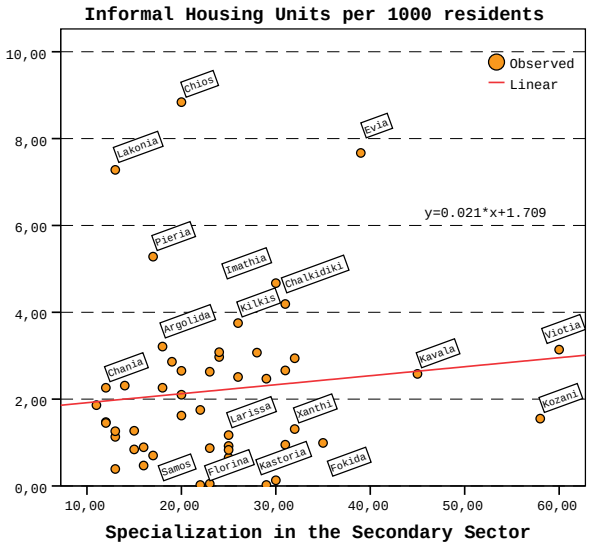
3


Informal Housing Units per 1000 residents
Observed
Logistic
y=1 / (0+1.043*0.989**x)
Rate of Urban Population

4


Informal Housing Units per 1000 residents
Observed
S
y=exp[0.667+(-6.274/x)]
Specialization in the Primary Sector

5


Informal Housing Units per 1000 residents
Observed
Linear
y=0.021*x+1.709
Specialization in the Secondary Sector

6

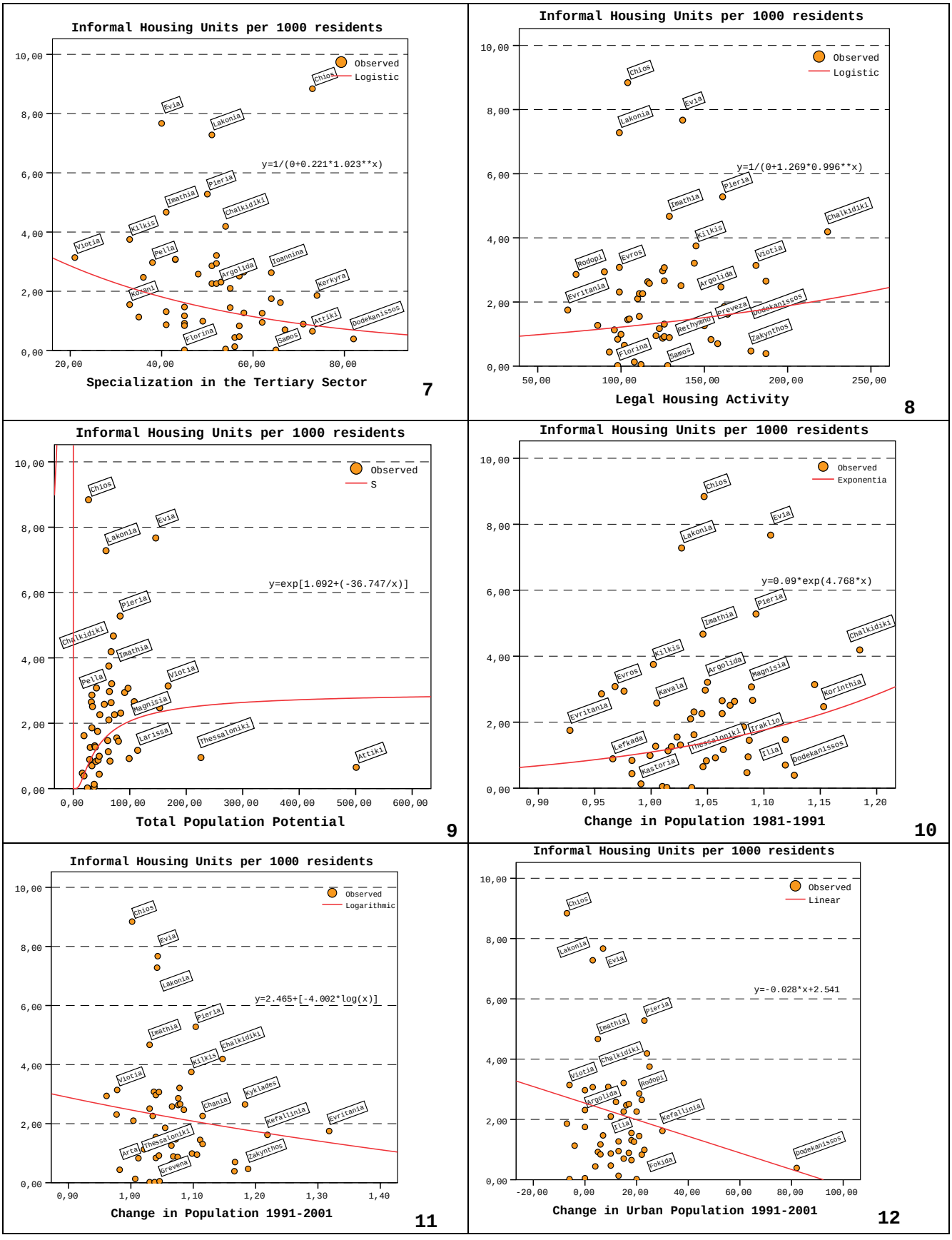



**Diagram 3: Curve Estimation Plots (1-12)**