

ENVIRONMENTAL LAND POLICY MEASURES AND SUSTAINABLE REGIONAL DEVELOPMENT IN CYPRUS

By Dr **Andreas S. CHRISTODOULIDES**

1. The developing role of Land Policy

In an attempt to quantify the developing role of Land Policy measures and its contribution to sustainable development, we have to investigate if theory refers to these measures. Generally speaking, it is believed that there is a strong relation between Economic and Sustainable Development and Land Policy which is attributed not only to the development which is created on the land, and in the existing buildings, but also to the increasing demand for building used as sheltering in a forthcoming development¹. The apparent increase in demand is supported, furthermore, by the reflection of the benefits which are added to the land value due to the result of the land policy measures².

Many econometric models³ try to ascertain if the constrains in the development influence it significantly and if the result from the implementation of such measures are predictable. Land Policy measures have been connected recently by many researchers with the problem of sustainable economic development⁴ and with the policies of density and discontinuation of building development.

2. The problem of choosing the indices of the development (independent or explanatory variables)

As can be assumed from the above analysis it is easy to suppose that economic development functions with a wide number of land policy measures, and therefore we must quantify these results in terms of development in order to analyse the current policy.

1. *Stimie J., - Tunnell Chr., (1992): «Urban containment and land-use planning», Land Use Policy, Vol. 9 (4), p. 36-46.*

2. *Pollakowski H.O., - Wachter S.M., (1990): «The effects of Land-Use constrains on housing prices», Land Economics, Vol. 66(3), p. 379-389.*

3. *Fischel W.A., (1990): «Do Growth Controls Matter» Cambridge, Massachusetts, p. 43-51.*

4. *Peiser R.B., (1989): «Density and Urban Sprawl», Land Economics, Vol. 65(3).*

An indispensable element of this work is the selection of an index which measures development and must have some characteristics as, for example, effects from land policy measures and the feasibility of its preparation.

As an indication of economic development, the usage of per capita income in our case presents two basic weakness. There are no disposable statistics and the per capita income is influenced by factors beyond the Land Policy.

For the purpose of this analysis an index is used, which relates to land values and because of the absence of such data we used as a substitute the number of buyings and sellings. As a dependent variable, with the role of the development index, the size and number is used for land sales spatial area with an explicit hypothesis that development and the percentage of change can be expressed by this index. Finally, this index is not an essential solution but a reliable measure of the land policy influences on spatial development. Data of the period 1985-94 have been used, which are not published and have been derived from the Department of Lands and Surveys.

The usage of the index is defined as follows:

$$AXIA 1 = \log (V_1/V_2) \quad (1)$$

$$AXIA 2 = \log (V_3/V_4) \quad (2)$$

$$AXIA 3 = \log (V_1/V_3) / (V_2/V_4) \quad (3)$$

Where

V_1 = the value of sales «outside the development area» (rural areas)

V_2 = the number of sales «outside the development area»

V_3 = the value of sales of building plots and plots «within the development area».

Defining AXIA as value, then the average value per area is AXIA 1, AXIA 2, AXIA 12, which is given in the Table 1.

Table 1
Average AXIA per Region

Region	AXIA 1	AXIA 2	AXIA 12
Nicosia Town	37038	18995	21231
Kythrea	5562	5010	5315
Oreini	4014	7049	4332
Morphou	1767	1280	1676
Lefka	3381	2856	3379
Famagusta	10045	9729	9820
Larnaca Town	29384	11172	14234
Aradippou	11134	7936	9412
Athienou	4999	5719	5071
Lefkara	5172	4118	5041
Limassol Town	24571	15450	18445
Kellaki	4079	4129	5014

Region	AXIA 1	AXIA 2	AXIA 12
Avdimou	10756	7070	8433
Koilini	3096	3990	3276
Paphos Town	22294	11262	15748
Paphos	6821	7644	6606
Kelokedara	843	1045	878
Chrysokhou	3675	3864	3712
Total	6612	5740	5647

Source: With the assistance of data from Department of Lands Surveys, 1995.

2.1. Land Policy measures as explanatory variables of spatial and regional development

These measures have the aim of promoting the spatial, regional and sustainable development and with this hypothesis according to the theory and the precedent of other econometric models, the following factors are the explanatory variables, between 37, which have been constructed for the study of the effectiveness of Land Policy and its contribution to the development of the regions (for more detail see Table 2).

i. Tenure System. In Cyprus the land is the property of (a) Greek Cypriots (GCY) which includes the property of Maronite, Latin and Armenian communities and also the property which belongs to the Greek Orthodox Church and church institutions, (b) Turkish Cypriots' land (TCY) which includes the immovable property of Moslem EVKAF and islamic institutions. Finally, (c) the property which belongs to the State and also includes public roads, rivers and forestry lands and lakes. In Cyprus, after the Turkish invasion and occupation of 1974, there exists a specific characteristic which must be taken into consideration, that TCY land ownership in the areas which are

Table 2
Independed Variable of the Model

Variable	Details
X1	Percentage of GCY property
X2	Percentage of State property
X3	Number of industrial zones
X4	Number of animal zones
X5	Number of agriculture zones
X6	Number of protectionary zones
X7	Number of tourist zones
X8	Average tourist building coefficient weighted by GCY property
X9	Average Maximum Tourist Building Coefficient (AMATBC) GCY property

Variable	Details
X10	Average Minimum Building Coefficient, weighted by GCY property (AMITBC)
X11	Number of Residential zones
X12	Average Residential Building Coefficient weighted by GCY property (ARBC)
X13	Average Maximum Residential Building Coefficient weighted by GCY property (AMARBC)
X14	Average Maximum Residential Building Coefficient weighted by GCY property (AMRBC)
X15	Average Residential Building Percentage (ARBP)
X16	Average Number of Residential Building Floors (ANRBF)
X17	Zones for Residential Summer houses (ZRSB)
X18	Coastal Spatial Areas
X19	Number of «Akritiki Periochi»
X20	Average distance from the nearest town
X21	Number of Consolidations
X30	Number of Spatial Areas with Improvement Boards a form of local authority
X32	Number of Industrial Areas
X36	District of Limassol
X37	District of Paphos

managed by the Government for the benefit of displaced persons. So, we must create an independent or explanatory variable along with all data because as it is supposed the category of land behaviour is different from that of property ownership of the rest of the Cypriots. For the Tenure System see Table 2 (it does not include occupied areas). Generally speaking, the tenure system, according to Land Economics, influences the economic development.

(ii) Local Authorities. In Cyprus there are three types of local authorities, which are the Municipalities, Improvement Boards and Village Authorities, and every type of authority has different powers, including Land Policy. So in an attempt to quantify the effects of economic and regional development it is essential to create three variables, one for every type of local authority.

(iii) The Zoning System. It is generally accepted that both the theory of Zoning and the empirical research which took place, especially in the United States, influence and redistribute development. Therefore the following zones, as explanatory variables, are used:

Table 3
Tenure System by District

District	GCY		TCY		State	
	Donum	%	Donum	%	Donum	%
Nicosia	913,605	69,07	35,120	2.66	373.934	28.27
Famagusta	167,710	82.92	136	0.07	34,413	17.01
Larnaca	411,556	57.56	109,035	14,21	216,553	18.23
Limnasol	709,177	68.44	97,796	9.44	229,282	22.13
Paphos	522,749	58.41	95,098	10.63	277,075	30.96
	2.754.797	65.23	332.187	7.98	1.131.257	26.79

Source: With the assistance of data from Department of Lands and Surveys.

- **Industrial Zones.** Which include industrial zones with increased restricted degree of pollution and the handicraft zones.

- **Animal Zones.**

(iv) **Agricultural Zones.** Agricultural activities can be potentially created wherever there is suitable land since no licence is required for this. However agricultural zones which are used here, mean that the existent characteristics (e.g. very low density coverage) do not leave margins for any other development, except that of agriculture.

(v) **Protection Zones.** Are used to protect both natural and man-made works and monuments.

(vi) **Zones for residential summer houses (ZRSB)** There is a distinctive difference between ZRSB and Tourist Zones which we will refer to later on.

(vii) **Residential Zones.** In this category all types of residential zones are included as well as their development coefficients. Theory and practice accept that the size of building plots regulate the level of development and simultaneously create boundaries of which the minimum size under which residential development coefficients, like the following, influence sustainable development:

- Average Residential Building Coefficient (ARBC),
- Average Maximum Residential Building Coefficient (AMARBC),
- Average Minimum Residential Building Coefficient (AMRBC),
- Average Residential Building Percentage (ARBP),
- Average Number of Residential Building Floors (ANRBF).

Table 4 gives a picture of Residential Zones and their Coefficients weighted by the total GCY ownership.

(viii) **Tourist Zones.** In this category all zones are intended for tourist development. It is accepted that the level of offering services functions inter alia, according to the following development coefficients:

- Average Tourist Building Coefficient (ATBC),
- Average Maximum Tourist Building Coefficient (AMATBC),
- Average Minimum Tourist Building Coefficient (AMITBC).

Synoptic vision of the number of tourist zones and their development coefficient are weighted by land belonging to GCY for every spatial area which is given in Table 4.

Table 4
Development coefficients of Residential Zones weighted by GCY ownership

District	Number Zones	ARBC	AMRBC	AMRBC	ABC	AFN
Nicosia	354	0.93:1	0.62:1	1.22:1	0.52:1	2.08
Famagusta	11	0.92:1	0.77:1	1.05:1	0.51:1	2.17
Larnaca	160	0.92:1	0.62:1	1.20:1	0.53:1	2.04
Limmassol	474	0.78:1	0.41:1	1.26:1	0.44:1	2.11
Paphos	316	0.87:1	0.62:1	1.11:1	0.49:1	2.01
	1315	0.88:1	0.57:1	1.20:1	0.50:1	2.07

(ix) **Coastal areas.** We define coastal areas as the spatial areas which are located in a distance up to 4 km from the sea.

(x) «**Akritiki periochi**». Cyprus after 1974 is in fact separated to the occupied area controlled by the Turkish army and the area which is under the control of the Government of the Republic of Cyprus. We define as «Akritiki periochi» the space which extends along the line of division, called the Attilas line, and covers a distance of 4 km. The line of occupation is supposed to be influenced by the spatial development.

Table 5
Tourist zones and average weighted development coefficients

District	Number of Zones	ATBC	ATM BC	ATMABC
Nicosia	0	0	0	0
Famagusta	11	0.22:1	0.17:1	0.27:1
Larnaca	27	0.07:1	0.05:1	0.08:1
Limmassol	24	0.04:1	0.02:1	0.06:1
Paphos	24	0.08:1	0.06:1	0.10:1
	86	0.05:1	0.04:1	0.07:1

3. The Model

We assume that there is a linear relationship between development index, and Land Policy measures and this relationship can be formulated with the following regressional model, which reflects the existent situation:

$$\log Y_1 = B_0 + B_1 X_1 + \dots + B_{37} X_{37} + U \quad (4)$$

$$\log Y_2 = B_0 + B_1 X_1 + \dots + B_{37} X_{37} + U \quad (5)$$

$$\log Y_3 = B_0 + B_1 X_1 + \dots + B_{37} X_{37} + U \quad (6)$$

Where: $\log Y_1 = AXIA 1$

$$\log Y_2 = AXIA 2$$

$$\log Y_3 = AXIA 3$$

To be continued...