

Prodromidis, Prodromos-Ioannis

Conference Paper

Functional Economies Or Administrative Units in Greece: What Difference Does It Make for Policy?

46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Prodromidis, Prodromos-Ioannis (2006) : Functional Economies Or Administrative Units in Greece: What Difference Does It Make for Policy?, 46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/118303>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

**FUNCTIONAL ECONOMIES OR ADMINISTRATIVE UNITS IN GREECE:
WHAT DIFFERENCE DOES IT MAKE FOR POLICY? •**

by

Pródromos-Ioánnis Prodromídís

Centre of Planning & Economic Research [KEPE]
22 Ippokratous Str., Athens 10680, Greece
Tel: [30] 210-3676412. Fax: [30] 210-3611136.
Email: pj@prodromidis.com.

Abstract

The paper provides the 2001 income mosaic of Greece at the local (municipal and post-code) level, and econometrically isolates a number of territorial, demographic, and occupational factors on declared income, on the basis of which it makes a number of policy proposals. The disaggregate nature of the data facilitates the construction of alternative spatial models that are juxtaposed to the regional framework on the basis of which national and EU sub-national convergence and prosperity plans are devised, implemented, and assessed. A specification based on the existing regional framework provides an inferior econometric fit, which, in turn, suggests that the economy does not operate according to the country's administrative divisions but rather according to local-specific factors and transportation linkages, as is the case in a fragmented land united by its transportation network. Accordingly, if income disparities are larger within administrative regions rather than across regions, it might make more sense if regional economic development policy were conducted within a functional-area framework rather than the current administrative-region framework.

Keywords: Local incomes, Disaggregate territorial indicators, Urban & rural development.

JEL-Codes: C21, J10, J20, R12

• Originally presented at KEPE seminars and OECD meetings, under the title “A Regional Analysis of Declared Incomes in Greece,” the paper has benefited from comments made to earlier versions by Prof. Vijay K. Mathur, Dr. Dimitrios Christelis, and the participants in the above seminars and meetings. Thanks are also due to Ms. Haido Kati for diligently helping match the census and revenue datasets. The usual disclaimer applies.

1. INTRODUCTION

This paper examines the regional distribution of personal income in Greece at the local level. Specifically, it is concerned with spatially disaggregated income data at the post code and municipal levels. In that sense, it is at variance with traditional regional studies for Greece, which focus on the administrative region and county levels according to the reported GDP statistics (Athanassiou et al., 1995; Siriopoulos and Asteriou, 1998; Petrakos and Saratsis, 2000; Tsionas, 2002; Christopoulos, 2004; Christopoulos and Tsionas, 2004); and more in line with the works of Bramley and Smart (1996), Bramley and Lancaster (1998), Caldwell et al. (1998), Green (1998), among others. In particular, it yields (a) an incomes map of Greece [Map 1] that distinguishes between towns and clusters of communities, urban and rural sub-regions, instead of smudging them within a county or region, and (b) an econometric analysis of multivariate regressions with large, disaggregated, territorial samples [Section 4] that distinguishes between regional and other effects.

We find that the spatial scatter of average incomes across communities reveals no obvious correspondence to the territorial divisions used for regional development policy. In fact, the examination of the data extracted from fine geographical units indicates that the emerging pattern of prosperous and poor localities is of a distinctly different sort. So, when compared to alternative specifications, the econometric model built around the formal territorial system provides an inferior fit, that is a less efficient way of analyzing the residents' economic performance. This implies the presence of a zoning effect in the grouping of area units (Amrhein, 1995), which suggests that we should take a fresh look at the economy as it truly is, i.e., a collection of clusters and often dissimilar communities, without preconceptions that certain territorial units or sub-regions must fit in an inherited regional framework, even if this is the framework on the basis of which the aggregate prosperity indicators are estimated and regional policy is decided and funded. In short, it appears that although the existing territorial framework, adopted by the government, affects and shapes the economy, it may have to be modified in order to better depict the real situation and serve as a more appropriate in-

strument for regional economic development. Furthermore, our empirical results point in the direction of a number of suggestions for promoting economic performance and prosperity across Greece.

The rest of the paper is organized as follows: Section 2 offers a brief report in terms of the country's terrain, territorial organization, and recent demographic and income statistics.¹ Section 3 provides an income-determination model on the basis of which Section 4 estimates alternative econometric specifications. Finally, Section 5 offers the main conclusions.

2. THE GEOGRAPHIC, ADMINISTRATIVE, DEMOGRAPHIC, AND INCOME LANDSCAPE OF GREECE

Located at the southern part of the Balkan peninsula, in south-east Europe, Greece covers an area of 132,036 square kilometers. The terrain is dominated by high mountain-chains, landlocked valleys, narrow coastal strips, a multitude of islands, and a very jagged coastline. These natural features greatly fragment the country into a host of tiny districts. Obviously, the splintering impact of the landscape is tempered by the effectiveness of the transportation network linking these districts (coastal strips, plateaus, and islands). However, the Greek road, rail, sea and air transport system is still rather inadequate by modern Western European standards.²

As indicated in Map 1, administratively the country is organized in thirteen administrative regions (NUTS level 2),³ namely, Attiki, Central Greece, Peloponnesos, Western Greece, Thessaly, Epiros, West Macedonia, Central Macedonia, East Macedonia & Thrace, the North Aegean Islands,

¹ Of these, the population figures derive from the 2001 Census, and the personal income-figures concerning the declared earnings in the census year derive from the 2002 Revenue Service records. The former were provided at the municipal level by the National Statistical Office of Greece [NSOG], and the latter were provided at the post-code level by the General Secretariat on Information Systems, of the Ministry of the Economy & Finance [MEF]. The two datasets were matched/aggregated exactly at the same level (ward by ward) into 895 territorial units, some of which are urban municipalities (consisting of several postal districts), and the remaining are rural postal districts (often encompassing more than one municipality and/or wards from different municipalities, depending on the configuration of land). The outcome has been deposited in the KEPE Data Archive with the designation *Greek Regional Economic Statistics I* (GRES I for short).

² A detailed discussion on the geographical and transportation characteristics of Greece are provided in my discussion paper under the same title, located in www.kepe.gr/pdf/D.P/dp_85.pdf.

³ The *Nomenclature des Unités Territoriales Statistiques* [NUTS] is the five-tier hierarchical structure used in the EU to standardize territorial units (EU, 2004a). Thus, the broad sub-national administrative regions are classified as NUTS level 2 sized-districts, counties or prefectures/nomes as NUTS level 3, municipalities or boroughs as upper level Local Administrative Units (LAU 1, occasionally termed NUTS level 4), municipal departments or wards as lower level LAU (or LAU 2, occasionally referred to as NUTS level 5).

the South Aegean Islands, the Ionian Islands, and Crete. These regions are subdivided into 51 prefectures (NUTS 3) consisting of 1,478 postal districts or 1,036 municipalities (LAU 1) that are further subdivided into 6,130 wards (LAU 2); which, for the purpose of our analysis (as mentioned in footnote 1), are reorganized in 895 small territorial units (localities), some of which are municipal and others are postal districts.

According to the 2001 Census, the country is inhabited by some 10.9 million people. The majority lives in private homes, whether alone (6.61%) or with other relatives (87.27%), in settlements of over two thousand people (72.78%). Of these, the largest conurbations are located around Athens-Piraeus (A) in Attiki, hosting a reported population of 3,588 thousand people, Thessaloniki (T) in Central Macedonia, with 914 thousand people, Patras-Rio-Antirio (P) in Western Greece, with 213 thousand people, followed by Irakleio (I) in Crete, Larisa (La) and Volos (V) in Thessaly, and Ioannina (Io) in Epiros, each inhabited by 160-120 thousand people. The majority are Greek nationals (93.04%). There also exist communities of other EU nationals (0.04%) and non-EU nationals (6.52%). About 5.41% is employed in the primary sector, 8.15% in the secondary, 21.96% in the tertiary sector, 1.97% in multiple or unspecified sectors, 4.46% is in transition (unemployed), while the remaining 57.83% of the population is ostensibly not pursuing such activities.⁴

According to the Revenue Service figures for 2001, the aggregate pre-tax income reported was € 61,307 billion, averaging nearly € 12,299 per declaration. (In Greece, couples file jointly even if taxed separately. This yields a national average of 2.2 people per declaration.) At the regional level, Attiki is associated with the highest average household income (€ 14,519), followed by the South Aegean islands (€ 11,507), Crete (€ 11,359), Central Greece (€ 11,092), Central Macedonia (€ 11,090), and the other regions, while the lowest figure pertains to Peloponnesos (€ 10,158).

⁴ In the next section we consider the level of their human capital. In terms of formal education, the Greek workforce comprises of 35.98% of all working-age residents (aged 15 or older) who received 0-9 years of schooling, 59.95% of all who attained upper-secondary education, and 78.67% of those with tertiary-level education, while the rest abstain from paid work.

MAP 1: The territorial clusters according to the average declared family incomes from 2001 and the regional division of Greece.



Key for color classifications:

<i>Color</i>	<i>Areas</i>	<i>Average income</i>
<i>Black</i>	Athens (A) along with its eastern, northern, and southern suburbs.	13,027-29,700 €
<i>Light gray</i>	Athens' western suburbs and the prosperous south-eastern districts.	11,273-13,478 €
<i>Dark gray</i>	Thessaloniki (T) and its environs.	11,315-21,509 €
<i>Red</i>	The districts along the highway to Halkis (H).	11,817-13,353 €
<i>Brown</i>	The other main nodes of the transportation system such as Patras (P), Irakleio (I), Larisa (La), Volos (V), Ioannina (Io).	11,249-14,826 €
<i>Pink</i>	The other main tourist sites.	11,245-13,107 €
<i>Purple</i>	The other poles of mining and industrial production.	11,400-19,399 €
<i>White</i>	The remaining areas of Attiki, East Macedonia & Thrace, West Macedonia, Western Greece.	4,505-11,309 €
<i>Yellow</i>	The remaining areas of the Ionian Islands, South Aegean Islands, Thessaly.	4,505-11,309 €
<i>Green</i>	The remaining areas of North Aegean Islands, Peloponnesos.	4,505-11,309 €
<i>Blue</i>	The remaining areas of Central Greece, Central Macedonia, Crete, Epiros (including an outlying postal district in Evia, Central Greece, that reports an average income of 11.844 €).	4,505-11,309 €

Similar distributions of average income (in the form of GDP per capita) are currently used by the national and the EU authorities in order to decide whether a region falls short or exceeds the 75% level of the EU average, which in turn determines the continuation (or suspension) of funding intended for regional development and convergence policies to level (upon leveling) the plane field.⁵ Nevertheless, empirical economists can do more than contrast averages from large territorial units as a means for detecting region-specific differences, especially considering that (a) the particular averages are likely to be affected by demographic, industrial, and other effects that are not region-specific;⁶ and (b) each average figure assessed from such a broad area is likely to hide sub-regional heterogeneity and may lead to the adoption of inappropriate economic policies.

Indeed, in the Aegean archipelago, each island constitutes a separate economic area and enjoys a different type of communication/integration (with other islands, Athens, the rest of Greece, foreign markets) and prosperity. Similar is the situation on the mainland (e.g., the countryside of Central Greece).⁷ On the whole, the visual survey of prosperous and poor localities [Map 1] reveals no obvious concentrations or patterns that run along regional lines, which suggests that (several or most

⁵ The EU regional development programs fund infrastructure, competitiveness projects, research & development, innovation, human resources, job creation, environmental management (EU, 2004b,c). The issue of Greek regional performance and its comparison to the rest of the EU prior to its eastward enlargement in 2004, is discussed by Armstrong and Vickerman (1995), Petrakos and Saratsis (2000), Button and Pentecost (1999), Le Gallo and Ertur (2003), Rodríguez-Pose and Fratesi (2004), and the sources cited therein.

⁶ Indeed, the multivariate regression technique is a more appropriate treatment for isolating the effects of various factors and identifying regional advantages and disadvantages.

⁷ For instance, in considering the disaggregated income landscape of the region, we identify four types of sub-regions:

- a) The belt along the Inofita-Halkis railroad and highway, along with the suburbs of Halkis. It accounts for 3.8% of Central Greece's total area, attracts 19.9% of the region's population and produces 24.2% of its total income.
- b) The basic nodes of the regional transportation system: Lamia, Amfissa-Itea, Karpeninisi, and their environs. They host 17.1% of the population on 9.2% of the land and produce 19.1% of the total income.
- c) The mineral extraction and energy production communities of Aliveri, Distomo, Larimna, along with the tourist site of Delfi. They exhibit a more balanced combination of population density: 4.7% of the population on 4.6% of the land, producing 6.4% of the region's income.
- d) The remaining (mostly rural) areas. They account for 82.3% of the area, and are inhabited by 58.1% of the population who produce 48.0% of the region's income.

On average, the annual average income in the developed districts (a)-(c) is € 16.6 thousand, and in the countryside (d) is € 9.7 thousand. This suggests an intra-region disparity ratio of 10:6. Consequently, when the national and EU regional-development authorities look at the regional average to compare it to the 75% EU prosperity threshold, to decide on whether they should provide development funding, they lose sight of the countryside's relative poverty and the disproportional contribution of the Inofita-Halkis cluster linked to Athens (which enjoys the spillovers from its proximity to Athens). As a result, they are left with the mistaken impression that the whole region prospers, even as (i) the large area -east and west of the Inofita-Halkis cluster- remains very much mountainous, divided by the two Euboean Gulfs, and in need of transportation infrastructure in order to integrate and enjoy spillovers from the capital; and (ii) there is sufficient evidence that Central Greece is one of the chronically disadvantaged EU regions in terms of job opportunities and population reduction (Boeckhout and Haverkate, 1995; EU, 2003, map 1.1).

of) the administrative regions are not sufficiently unified economic areas to justify the implementation or discontinuation of economic policies on the basis of aggregate prosperity indicators extracted from these regions. In fact, the prosperous districts:

- a) are contiguous to Athens-Piraeus and Thessaloniki or extend along the immediate rail and motorway network,
- b) correspond to the country's main transportation nodes on the mainland, the Ionian and east Aegean islands, and northern Crete, or
- c) involve the long-established tourist places (directly linked to Athens-Piraeus) not included in (a) and (b) above, and the major industrial sites of energy production and mineral extraction.

So in the following pages we further investigate the misalignment between the territorial framework employed by regional development planners and the spatial pattern of relative prosperity, by engaging in the quantitative treatment of the disaggregate income data, under three alternative regional specifications:

- i) one based on the territorial divisions used by the national and EU regional development authorities,
- ii) another one based on the above-mentioned characteristics of towns and clusters of contiguous localities, in order to assess their specific advantages and disadvantages, and
- iii) a combination of the two previous specifications.

3. THE MODEL

We turn our attention to the construction of a linear model of income determination that considers the role of territorial factors in the form of the three regional specifications mentioned above, and other determinants. The latter include population density, household size, residents' economic activity and education, ethnicity, and non-labor income. These regressors are fairly common and are en-

countered in other earnings functions as well,⁸ while the linear format provides a very satisfactory fit.⁹

We justify our choice of explanatory variables by attributing the generation of personal and family income to the characteristics of (a) *individuals organised in households*, engaging in time-allocation decisions according to the skills, resources, and preferences of the household members; and (b) *local communities or clusters of communities*, because they provide the environment in which individuals and households operate.¹⁰ In short, we seek to explain income heterogeneity in terms of region/community-specific effects, and effects associated with the characteristics of the local populations, net of the previous effects.¹¹ The region-specific or community-specific arguments employed in our econometric analysis are:

- a) The regional or spatial-cluster dummy variables (R). These serve to classify the observations (i.e., the 895 small territorial units) into economic zones in accordance with (i) the established regional organization used by the national and EU administrations on the basis of presumed economic characteristics, and/or (ii) the presence of particular businesses or facilities, their role in

⁸ Indeed, several of these explanatory variables feature in the studies mentioned in the introduction. Additionally, Card (1999) sites numerous examples from the international literature, engaging in regressions of individual earnings on education, marital status, race, and large city, urban or other regional residence dummies. McCall (1998) regresses U.S. wages of high school and college graduates on the population, the population shares of unemployed, immigrant and casual workers, the industrial sector sizes, the urban and other regional dummies. Nilsson (2001) regresses changes in Swedish earnings on people's country of origin, education, the presence of children and partners, as well as on urban, other regional, and occupation dummies. Prodromidis (2005) regresses British wages on people's birthplace, education, the presence of children, and considers the impact of family size, non-labor income, and regional dummies in the estimation of the non-selection hazard.

⁹ As regards the appropriateness of the model: Ramsey's regression specification error test suggests that there are no omitted variables; and according to the Hausman specification test, the sectoral and citizenship population-shares vectors (F-test), and the two non-labor income regressors (t-test) are not simultaneously determined with the dependent variable, while the education-occupation shares (F-test) are not simultaneously determined with the level of family income at the 10% level -though perhaps they are at the 5% level. Furthermore, the specification is preferable compared to alternatives (log-log or semilog) not only for the sake of simplicity and uniformity in the discussion of the spatial and non-spatial non-spatial variables, but also because the log-lin model produces an inferior fit, and the log-log and lin-log models suffer from the loss of observations (localities are dropped) when the explanatory variables take the value of zero.

¹⁰ This economic environment may vary across communities of clusters of communities depending on the configuration of the land, operation of industries and institutions, proximity/remoteness to other marketplaces and sites, size of the population, cost of living, down to the income-earning-spending-and-declaring culture.

¹¹ In essence we reshape each set of explanatory vectors into truly independent variables by removing from them the linear effects of the other (previously listed) explanatory vectors, so that they are not accounting for them even partially. Briefly put, instead of regressing Y on, say, X , Z , and W , we first regress Z on X , predict \hat{Z} , and estimate $\ddot{Z} = Z - \hat{Z}$; then regress W on X and \ddot{Z} , predict \hat{W} , and estimate $\ddot{W} = W - \hat{W}$; and end up explaining Y in terms of X , \ddot{Z} , and \ddot{W} .

the urban and transportation networks, their relative proximity to other labour markets and centres.

- b) The land-to-population ratio (L/N). It is employed as a seclusion-proxy aimed to capture the impact of fewer monetary transactions and weaker multipliers in sparsely populated communities.¹²
- c) The population-per-revenue statement ratio (N/r). This is used as a proxy for the typical household-size per locality,¹³ and as an instrument of isolating supplementary community-specific characteristics associated with irregular patterns of joint-filing and revenue-underreporting. (In Greece couples file jointly even if taxed separately. This yields a national average of about 2.2 people per declaration, and in general we expect to have one revenue statement per household.)

The isolation of these factors enables us to consider the effects caused by additional determinants such as people's human capital and their division of labour. In short, having accounted for the impact of presumed regional features or location in the urban/transportation and industrial production systems, and having isolated the effects of the population-density and (average) household-size factors in each community, we concentrate on the remaining population-activity effects. So, we consider the effect of each local population's typical characteristics (i.e., education-shares, occupation-shares, etc., each of which amounts to 100%). In fact, we make the local populations comparable by standardizing their size to one, and consider the influence of each local population's composition as if it is a proxy for the "typical household" within each community. At the core is the mechanism of household income (Y) formation per year:

¹² This is the inverse of population density, adopted in this form in conformity to the other population ratios, and employed here in order to isolate the effects associated with the relative sparseness/congestion of places.

¹³ According to Lam (1997) the level of household income tends to increase with household size, and, indeed, the two may be jointly determined. Yet, in fertility studies, household size (or fertility) is considered the dependent variable (e.g., Hotz et al., 1997; Schultz, 1997; the sources cited therein), while in labor supply equations (and -by extension- in earnings function) that rely on cross-sectional data, it is taken to be exogenous (Montgomery and Trussell, 1986; Browning, 1992). In the present study, according to the Hausman specification test, the regressor is not simultaneously determined with the regressand.

Following the established tradition in labor economics (e.g., Becker, 1965; Killingsworth, 1983) that regards households as small factories, whose members contribute their time, skills, and non-labour resources in order to produce (or acquire the means to purchase and combine goods and services), and then consume the various commodities, we set up a family income model according to which income consists of earnings from on-going work activities (E), non-labour income, such as rents and interests (I), and past labour-related or transfer income, such as pensions (P), i.e.,

$$Y = E + I + P \quad [1]$$

Consequently, the level of earnings from current work activity (E) is taken to depend on:

- a) The number of those currently engaged in paid work activities (W), their formal qualifications (q), and the returns in the sectors (S) they are employed. Given our data, in each community, q_i stands for three levels of educational attainment (0-9 years, upper-secondary, tertiary level), and S_h for five types of paid-work activity (primary, secondary, tertiary, undeclared/mixed sector, transition/unemployment).¹⁴ So the workforce is divided into corresponding subgroups, $W(q_i)$ and $W(S_h)$, each with its own impact.
- b) The size and skills (q) of those aiding the previous group by engaging in unpaid work at home and in the family business (A).¹⁵ This reserve workforce is also divided into three $A(q_i)$ educational subgroups.
- c) The number of young children (C) because their presence and upbringing-needs intensify the income-accumulation and domestic activities of older members.¹⁶
- d) People's backgrounds (B) for they reflect different legal constraints, traits (real or perceived by employers), as well as different experiences, work ethics, reservation wages, support networks.

¹⁴ For the key-roles of human capital/education and the employer-sector in wage determination, see Freeman (1986), Hamermesh (1986), Willis (1986), Rosen (1986), Katz (1999), and the literature cited therein.

¹⁵ Their decision with regard to time allocation is simultaneously determined with that of the other members. Their efficiency depends on domestic technology and affects the household's overall income-earning activity. The consideration of their observed characteristics (education, etc.) is essential in the imputation of any second-generation paid work function.

¹⁶ Though we lack time-budget data to properly measure the children's impact on labor supply, following Browning (1992), we expect that the presence of children will generate a need for more income.

The background proxy supplied in our data consists of Greek, other EU, and non-EU citizenship indicators, and, consequently, is organised into three groups (B_l).

- e) The household's access to other income (I and P) for it affects the intensity of current income-accumulation activity through the labour supply function, in addition to the direct “add-on” manner in expression [1].

For the sake of simplicity we add up each factor's impact, linearly. Thus, we write:

$$E = a_i W_i(q_i) + a_h W_h(S_h) + a_j A_j(q_j) + a_k C + a_l B_l + a_m I + a_n P, \quad [2]$$

where the explanatory-variable subscript

$i = (1,2,3)$ denotes the three levels of educational attainment in the workforce,

$h = (1,2,3,4,5)$ denotes the five types of paid work activity,

$j = (1,2,3)$ denotes the three levels of educational attainment for those outside the active workforce, and

$l = (1,2,3)$ denotes the three citizenship indicators.

The substitution of expression [2] into expression [1] yields:

$$Y = a_i W_i(q_i) + a_h W_h(S_h) + a_j A_j(q_j) + a_k C + a_l B_l + (I + a_m)I + (I + a_n)P. \quad [3]$$

Summing across all households we obtain:

$$\Sigma Y = a_i \Sigma W_i(q_i) + a_h \Sigma W_h(S_h) + a_j \Sigma A_j(q_j) + a_k \Sigma C + a_l \Sigma B_l + (I + a_m) \Sigma I + (I + a_n) \Sigma P, \quad [4]$$

where $\Sigma W_i = \Sigma W_h$ and $\Sigma W_i + \Sigma A_i + \Sigma C = \Sigma B_i = N$.

The *per capita* level of expression [4] is given by:

$$y = a_i w_i + a_h w_h + a_j \hat{a}_j + a_k c + a_l b_l + (I + a_m) i + (I + a_n) p, \quad [5]$$

where $y = \Sigma Y/N$, $I = \Sigma I/N$, $p = \Sigma P/N$, stand for the respective per capita incomes in each community, and $w_i = \Sigma W_i/N$, $w_h = \Sigma W_h/N$, $\hat{a}_j = \Sigma A_j/N$, $c = \Sigma C/N$, $b_l = \Sigma B_l/N$, stand for the respective population-shares in each community.

Accordingly, the average declared household income per community, obtained from the division of total community income by the number of declarations ($\hat{Y} = \Sigma Y/r$), may be decomposed and expressed as the sum of:

a) the regional components, in accordance with the discussion preceding expression [1],

where $\tilde{a}_a, \tilde{a}_b, \tilde{a}_c$ stand for regional coefficients, and

b) the other, population-specific, components (i.e., expression [5]). Thus,

$$\hat{Y} = \{\tilde{a}_a R + \tilde{a}_b L/N + \tilde{a}_c N/r\} + \{a_i w_i + a_h w_h + a_j \hat{a}_j + a_k c + a_l b_l + (1+a_m)i + (1+a_n)p\}, \quad [6]$$

where the variables on the right-hand side are:

- the regional dummies (R),
- the seclusion proxy (L/N), and its square in order to capture the rate of change,
- the household-size proxy (N/r), and its square in order to capture the rate of change,
- the population shares of those engaged in paid work activities in accordance with their educational composition (w_i) and their involvement in the production process (w_h),
- the population shares of the unpaid/reserve workforce according to the educational makeup (\hat{a}_j),
- the population share of children (c),
- the population shares by nationality (b_l),
- the per capita non-work income (i), and
- the per capita past-work or transfer income (p).

Finally, as already mentioned (page 11), to avoid correlations among these variables, we take proxies that are net of the impact of previously-listed factors.

4. THE ECONOMETRIC ANALYSIS

We commence the econometric analysis by employing the two alternative territorial specifications: one based on the formal administrative/regional division of the country; the other based on the characteristics of towns and clusters of contiguous localities (situated along the transportation net-

work or in proximity to the industrial and tourist poles). The former involves a set of 12 territorial dummy variables explaining 44% of the total income variation; and the latter involves a set of 10 dummies that explains 70%. This means that (a) the remaining variation is captured by other factors, and (b) the variation among regions is smaller than the variation within regions, which, in turn, suggests that the economy does not operate according to the regional divisions of the former model but rather according to local-specific factors and transportation linkages, as is reasonable to expect in the case of a fragmented country united by its transportation network. The finding reinforces the view that the traditional regional model cannot very well explain how the country functions with respect to local income determination, which, in turn, suggests that it is not proper to base a development policy on the assumption that such a model is appropriate.

We incorporate the remaining explanatory variables (i.e., a common set of factors) and proceed to study the two alternative specifications in their complete form according to the income-determination model [expression 6]:

- Version 1 is based on the regional organization of the country,
- Version 2 underlies the role of Athens, Thessaloniki, and the other distinct communities forming the main nodes of the country's transportation network, along with the other important tourist and mineral-extraction and energy-production industrial communities.

In their complete form, the two versions exhibit a high level of statistical fitness, with R^2 values of 91.10%, and 92.08%, respectively. Between the two, Version 2 may be closer on statistical grounds. Additionally, the regional coefficients of Version 1 are dominated by the differences between Attiki and the rest of the country, causing the regional coefficients to appear more-or-less uniform. So, its informative value can also be channeled in a manner that complements the merits of the other version in a third specification, namely

- Version 3 that combines the characteristics of the preceding versions. As such, it provides a more detailed picture than either of the other versions. Furthermore, it is associated with a

slightly higher $R^2 = 92.77\%$,¹⁷ and has the advantage of maintaining several features of the regional framework used by policymakers to shape the economy.

Version 1: An econometric analysis based on the regional divisions (at the NUTS level 2)

The region of Attiki serves as the reference area, and the working-age nationals with basic formal education who abstain from paid work, serve as the reference population of the econometric analysis. The estimated coefficients are given in Table 1, column 1, and the intercept is estimated at € 14,745.6.

The regional coefficients suggest that, on average, households in East Macedonia - Thrace earn annually nearly € 7,300.6 thousand less than their counterparts in Attiki, while households from the other mainland regions, Crete, the Ionian and North Aegean islands earn € 6,976.5 - 5,187.8 less, and those in the South Aegean € 4,658.5 thousand less.¹⁸ At the same time, the area-to-population coefficient (net of the above-mentioned regional effects) indicates that people residing in sparsely populated places are poorer when compared to those residing in densely populated areas, while the typical household-size effect is indistinguishable from zero.

According to the coefficients of the other (transformed) variables, a percentile increment in the share of working-age nationals with upper-secondary education qualifications, who also abstain from paid work is indistinguishable from zero, and a similar increment in the share of their counterparts with university qualifications is associated with a positive effect of € 23,698.4. Similarly, a marginal increment in the population share of workforce participants with minimal or basic formal education yields a negative effect of € 6,083.5. Equivalent increments in the ranks of workforce participants with upper secondary and university qualifications yield income increases of € 5,597.9 and 42,920.4, respectively; and a similar increment in the population share of children aged 0-14 is

¹⁷ All three versions are originally heteroscedastic (in terms of White's test, $X^2 = 82, 97, 101$, respectively) so we will resort to regression analysis with robust standard errors. For comparative purposes, the uncorrected-error specification of the third model yields an improved R^2 adjusted (92.43%) compared to the regional version (90.79%) and the locality based version (91.82%).

¹⁸ So, although Peloponnesos is listed last in terms of average income (see page 3), it is not necessarily the most disadvantaged region in terms of region-specific factors.

TABLE 1: Econometric analysis of declared income in Greece across the 895 municipal/postal districts from a data-match of the 2001 Census and 2002 Revenue Service figures

<i>Dependent Variable: Average declared income in each locality, in euro (€)</i>		<i>Coefficients and t-statistics obtained through a robust variance estimator</i>			
<i>Explanatory Variables (of which # 2-23 are dummy variables)</i>		Version 1 Admin. regions (NUTS 2)	Version 2 Clusters of localities	Version 3 Combination of models 1&2	
1	The reference population in the area cited in the notes a,b,c	14745.6 (139.5)	8229.9 (248.3)	10257.5	(74.8)
<u><i>Regional and community specific factors</i></u>					
2	Athens & the eastern-northern-southern suburbs (Map 1 in black)		9586.0 (49.2)	7558.5	(32.6)
3	Athens' south-eastern districts (indicated in Map 1 with light gray)		4202.1 (32.0)	2174.4	(11.7)
4	Athens' western suburbs (indicated in Map 1 with light gray)		4134.5 (29.8)	2106.9	(11.4)
5	Districts along the highway to Halkis (indicated in Map 1 with red)		4000.1 (28.9)	1972.5	(10.1)
6	Thessaloniki and its environs (indicated in Map 1 with dark gray)		5092.6 (14.1)	3064.1	(8.0)
7	Other main transport. nodes on the mainland & Ionian isl.		4022.9 (37.9)	1995.1	(11.6)
8	Main transportation junctions on the island of Crete		4077.7 (19.0)	2050.1	(8.0)
9	Main towns on islands with airports close to Asia Minor		4214.0 (15.9)	2186.5	(8.0)
10	Other tourist cites in the Cyclades, and Delfi, Lindos, Idra		4018.9 (18.0)	1991.3	(7.5)
11	Other poles of mining & industrial production		5740.5 (11.3)	3712.8	(7.3)
12	Thrace & East Macedonia	-7300.6 (48.6)		-2698.2	(15.4)
13	Central Macedonia	-5513.7 (37.6)		-1881.2	(12.4)
14	West Macedonia	-6930.0 (40.0)		-2666.0	(14.1)
15	Thessaly	-6979.5 (47.3)		-2603.1	(15.3)
16	Epiros	-6888.4 (41.1)		-2648.0	(13.8)
17	Western Greece	-6764.4 (47.9)		-2584.3	(15.4)
18	Peloponnesos	-6523.1 (48.8)		-2322.3	(14.6)
19	Central Greece	-5187.8 (32.5)		-1340.8	(8.0)
20	Ionian islands	-5589.1 (31.4)		-1438.7	(7.1)
21	North Aegean islands	-5460.7 (32.8)		-1484.2	(7.8)
22	South Aegean islands	-4658.5 (21.4)		-833.4	(3.4)
23	Crete	-5845.9 (40.7)		-1876.8	(11.3)
24	Area in m ² /Population (net of the previous effects)	-18.0 (22.1)	-11.1 (15.0)	-10.4	(13.3)
25	Area in m ² /Population – square	0.0 (21.5)	0.0 (15.2)	0.0	(12.9)
26	Average household size (net of effects 2-24)	-23.5 (1.2)	-49.3 (3.0)	-48.6	(3.0)
27	Average household size – square	0.2 (1.2)	0.3 (3.0)	0.3	(3.0)
<u><i>Household composition & access to non-work income</i></u>					
28	% below the legal working age (net of effects 2-27)	12122.3 (8.9)	11648.5 (9.1)	11566.5	(9.1)
29	% not in workforce, 0-9 years of school (reference)				
30	% not in workforce, upper sec.-school grads. (net of effects 2-27)	-1148.7 (0.4)	-1754.4 (0.8)	-3093.3	(1.4)
31	% not in workforce, tertiary level graduates (net of effects 2-27)	23689.4 (3.8)	33886.5 (5.3)	32686.6	(5.4)
32	% in workforce, 0-9 years of school (net of effects 2-27)	-6083.5 (6.7)	-5881.9 (7.2)	-5601.5	(6.6)
33	% in workforce, upper sec.-school graduates (net of effects 2-27)	5597.9 (3.3)	3719.6 (2.5)	2155.6	(1.4)
34	% in workforce, tertiary level graduates (net of effects 2-27)	42920.4 (21.8)	34155.8 (12.9)	34803.1	(14.1)
35	% in workforce, in transition, unemployment (reference)				
36	% in workforce, in primary sector (net of effects 2-34)	2870.4 (1.1)	6020.2 (3.1)	1583.2	(0.7)
37	% in workforce, in secondary sector (net of effects 2-34)	18045.0 (5.8)	16810.4 (7.0)	13822.2	(5.8)
38	% in workforce, in tertiary sector (net of effects 2-34)	2978.6 (0.8)	9852.5 (4.3)	2491.2	(1.0)
39	% in workforce, in mixed/undeclared sector (net of effects 2-34)	13567.3 (2.2)	20281.3 (4.0)	13061.8	(2.4)
40	% Greek nationals (reference)				
41	% other EU nationals (net of effects 2-39)	4065.6 (0.7)	6838.1 (1.3)	4920.8	(1.0)
42	% non-EU nationals (net of effects 2-39)	158.6 (0.1)	2323.7 (2.4)	1707.6	(1.8)
43	Per capita income from past work (net of effects 2-42)	0.5 (3.4)	0.4 (3.9)	0.3	(2.4)
44	Per capita income from non-work sources (net of effects 2-42)	2.2 (5.4)	2.0 (4.4)	2.2	(5.2)
<i>Statistics: F</i>		249.16	313.76	245.18	
<i>R²</i>		0.9110	0.9208	0.9277	

^a In Version 1, the region of Attiki. It consist of the black, gray, and white colored areas of Map 1 located near the toponym (but not Kea, the gray-colored island on the right of that particular regional appellation), along with Idra (the pink-colored island below the name), Kithira and Antikithira (the two brown-colored islands between Peloponnesos and Crete), and the southern part of the red area.

^b In Version 2, the rest of Greece (i.e., the least urbanized, industrialised, tourist-oriented clusters).

^c In Version 3, the remainder of Attiki (i.e., the intersection of Attiki and rest of Greece), indicated on the map with white.

associated with an income increase of € 12,122.3. Moreover, increased involvement in the secondary and mixed/undeclared sectors by 1% affects further income increases by € 18,045.0 and 13,567.3, respectively, while analogous expansions in the primary and tertiary sectors are statistically indistinguishable from zero. At the same time, the effects of foreigners are indistinguishable from those of natives, and marginal increments in past-work and non-work earnings yield added effects on the level of average income of nearly € 0.5 and 2.2, respectively.

Version 2: An econometric analysis on the basis of clusters of localities

This version preserves the non-dummy explanatory variables and the reference population.¹⁹ However, it employs different spatial dummies that reflect groupings of adjacent localities or areas with similar characteristics vis-à-vis the rest of Greece (the new reference area). Since it employs fewer regressors and yields a somewhat higher R^2 , it seems to provide a better statistical fit when compared to the previous version. Its estimates are provided in Table 1, column 2, and the intercept is estimated at € 8,229.9.

The territorial coefficients indicate that Athenian households earn, on average, an extra € 9,586.0 per annum compared to the households from the reference area. At the same time, their counterparts from the nearby districts in the south, west or north (i.e., along the highways to Lavrio and the new airport, to Elefsis or Halkis, respectively) earn an extra € 4,202.1 - 4,000.1. Thessalonian households and the households in the major industrial sites make € 5,092.6 – 5,740.5 more, while households from the other transportation junctions on continental Greece and the Ionian islands, Crete, the developed centers in the eastern Aegean, and the other main tourist-sites, make € 4,018.9 - 4,218.9 more. As in the previous model, the land-to-population coefficients suggest that people residing in sparsely populated places are poorer. However, in this version, the typical household-size coefficients become statistically significant, and indicate that, on average, additional members (presumably dependents) bring about a reduction in income.

¹⁹ I.e., working-age nationals with minimal or basic schooling that abstain from paid work involvement, the majority of which seems to belong to the age groups 55-64 and, especially, 65 or over.

According to the coefficients pertaining to population shares, a marginal increment in the share of children aged 0-14 is associated with an income increase of € 11,648.5; and equivalent increments in non-workforce participants with upper-secondary and university-level qualifications, are associated with effects that are indistinguishable from zero in the case of the former, and positive (€ 33,886.5) in the case of the latter. At the same time, similar increments among the workforce segments with minimal, upper-secondary, and university qualifications, yield effects of € -5,881.9, 3,719.6, and 34,155.8, respectively. Furthermore, an expansion of 1% in primary, secondary, tertiary and undeclared/mixed sector employment is associated with additional income increases averaging € 6,020.2, 16,810.4, 9,852.5, and 20,281.3, respectively. Much like in the previous case, the marginal increments in past work and non-work earnings yield effects of nearly € 0.4 and 2.0, respectively, while the impact of EU nationals remains statistically indistinguishable from that of natives. However, the new specification reveals that a percentage increment in the share of non-EU nationals has an additional impact on average income by about € 2,323.7.

Version 3: An econometric analysis according to clusters of localities and regional divisions

This is a combination of Versions 1 and 2. As such, it maintains the same reference population while incorporating the territorial regressors entering the other two versions. Consequently, its regional reference is a subset of the one employed in Version 1 (i.e., Attiki) insofar as it excludes the territorial regressors of Version 2 (i.e., Athens and its environs). Hence, it consists of the region's peripheral districts. The new specification contains more variables than the previous ones, so it is richer in this respect. Its estimated coefficients are given in Table 1, column 3. They maintain the signs of the previous versions, and the intercept is calculated at € 10,257.5

According to the regional results, Athenian households earn on average an extra € 7,558 each, annually, while the households from a broad belt around Athens (from the south-eastern districts, the western suburbs, the northern rail-and-motor way) also earn an extra € 2,174.4 - 1,972.5 vis-à-vis their counterparts from the reference area (in the Attic periphery). At the same time, Thessalo-

nian households and households in the main industrial centers make € 3,064.1 and 3,712.8 more, respectively, while households from the developed areas of the eastern Aegean, the main urban centers of the mainland, the Ionian islands, Crete, and the better-known tourist-poles make € 2,186.5 - 1,991.3 more. The narrowness of bands suggests strong similarities among these types of communities.

In contrast, the coefficients pertaining to the remaining 85.2% of the country indicate that households from the rest of East Macedonia - Thrace, West Macedonia, Thessaly, Epiros, Western Greece and Peloponnesos make roughly € 2,698.2 - 2,322.3 less; households residing in the rest of Central Macedonia and Crete earn € 1,881.2 - 1,876.8 less; those from other areas in the North Aegean, and Ionian islands, and Central Greece make € 1,484.2 - 1,340.8 less, and those from other sites in the South Aegean € 833.4 less. These coefficients explain over 78% of the average incomes of the wide territorial zones to which they correspond (the remainder is attributed to other factors), so they provide very good indices of spatially-related homogeneity, and prosperity benchmarks against which the impact of future regional policy can be measured. Additionally, much like in the case of the prosperous communities, they also fall within tight income ranges. This lends support to arguments in favor of structuring the country's regional development agencies after the country's functional economies -especially if the purpose is to deal with income disparities and better tackle economic distress. Such a re-organisation will sharpen the focus and improve the overall planning and funding decisions of the regional development policymakers. In particular, considering the closeness in the values of these coefficients along with the geographic configuration and proximity of the areas involved, we suspect that a possible regional reengineering could tentatively involve the establishment of a number of prosperous districts (that are treated separately to preclude masking intra-regional heterogeneity), and about four large (super-) regions (e.g., the rest of Attiki-Central Greece-Aegean islands; the rest of Epiros-Western Greece-Peloponnesos, along with the Ionian islands on account of their proximity; the remainder of Thessaly-Macedonia-Thrace; Crete) that are

in need of infrastructure and economic development. It is conceivable that the grouping as well as the reduction in the numbers of disadvantaged regions will facilitate in both infrastructural planning and project coordination.²⁰

As in the previous models, the inverse population density coefficients indicate that people residing in sparsely populated places are relatively poorer; and the typical household-size proxy suggests that additional members are associated with a reduction in income.

Having isolated the regional and community effects, we now turn to the (residual) household composition results. In particular, a marginal increment in the population-share of the workforce with minimal or basic schooling is associated with a € 5,601.5 reduction in average income. Broadly speaking, this is a sure sign of overcrowding and low productivity and inefficient human resource allocation. Equivalent increments in the population shares of upper-secondary school graduates yield a negative effect on income (- € 3,093.3) for those who abstain from paid work, and a positive one (€ 2,155.6) for those who participate. Both results are at the 15% margin of error, which suggests that they should be interpreted with care. Yet, they suggest, *ceteris paribus*, that:

- a) considering the performance of the modestly-skilled workforce (associated with a likely positive marginal impact of € 2,155.6), unless self-selected, the low-skilled workforce (associated with the marginal negative impact of € 5,5601) could become more productive through continuous education and skill-upgrading processes;
- b) the enticement of upper-secondary school graduates who abstain from paid work (associated with a likely negative effect of € 3,093.3) to the active workforce can lead to higher incomes, considering the performance of their workforce counterparts (associated with a likely positive marginal impact of € 2,155.6).

²⁰ Yet, to fully identify the functional economies and enhance our understanding on how the Greek economy operates (and provide more thorough long-term tools to the national and EU regional development authorities), we have to consider the local data vis-à-vis the demographic, human capital, specialization, occupation and unemployment statistics, as well as commuter-patterns. These are, however, beyond the scope of the current study.

In short, on the basis of the estimated coefficients, the continued education of members of the workforce with basic qualifications in order to acquire upper-secondary school qualifications, along with the attraction of upper-secondary school graduates into the workforce, are likely to have a positive impact on the average level of income. The simultaneous reduction in the population shares of the respective low-skilled or non-participants is likely to amplify these results.

Moving on to the coefficient pertaining to the children aged 0-14, we come across an interesting result. That is, a marginal increment in the population-share of children (presumably through increases in the birth-rate) stimulates additional income-earning activity by € 11,566.5. So, it would appear that the prospect of more work/higher wage needed to cover children expenses is at the heart of couples' decisions/tendencies to have few kids.²¹

However, the highest effects of the whole model come from university graduates. According to the recovered estimated coefficients, a percentage increase in their population shares results in higher earnings of € 34,803.1 for those who participate in the workforce, and € 32,686.6 for those who abstain from paid work. These results suggest, when compared to other groups, that the highly qualified segments of the population are much more productive at the workplace and/or are capable to generate substantial positive externalities through their domestic and other roles. Consequently, families, regions, and the country as a whole may improve their economic performance by aiming to the growth of these percentage shares through (a) the reversal of the country's brain-drain of educated young who left/leave the country in order to engage in further studies overseas, and often stay there; (b) the promotion of tertiary-level education among the young, and the promotion of continued education programs among the not-so-young that lack such qualifications; and (c) the attraction of expatriates and immigrants with university qualifications.²²

²¹ The finding also presents a society with a treatment for reversing the low-birthrate: namely, the reduction of the relative cost of having and rearing children. This may be achieved through the provision of relevant incentives and breaks or through the widespread improvement in real income (usually associated with economic growth).

²² The country ranks 24th among the 30 OECD member states in terms of its population share of upper-secondary school graduates (OECD, 2004: 68-69), and 19th in terms of university graduates aged 25-34 (OECD, 2003: 54). Without a sufficiently large pool of a highly educated young workforce (or prospective workforce) it is difficult to build compara-

In considering the effects of increased involvement in the primary and tertiary sectors, we find that these are indistinguishable from zero, which suggests that in the current state of technology, staff mentality, and orientation, both sectors are overcrowded, not productive, and in need of reform. On the other hand, a percentile increment in secondary or mixed/undeclared sector involvement results in higher incomes of € 13,822.2, and 13,061.8, respectively. These findings suggest similarities in staffing composition and production processes. Furthermore, the higher level of productivity²³ makes the secondary sector an obvious vehicle for boosting family and national income, through sector-expansion and the redirection of unemployed or excessive workforce into the sector. However, specific recommendations as to which sub-sectors are in order, is beyond the scope of this study.

As in the previous model specification, there is some indication that non-EU nationals might have a somewhat higher effect (€ 1,707.6, at the 7.3% level of error) in the Greek economy compared to natives and other EU nationals. However, without knowing the hours of paid work we cannot draw inferences as to whether we should attribute this to their productivity or overwork.

Of the two instruments for income inputs that do not depend on on-going labor-activity, we find that a € 1 pension-increment is partially offset by a reduction in income-earning activity by the recipient or by the other household members. At the same time, a similar € 1 increment in property income stimulates further income-earning activity. In terms of the income-determination expression [4], $a_n < 0$ and $a_m > 1$.

To briefly summarize these results: The 13-region specification (Version 1) explains 44% of total variation, while the locality-specification (Version 2) explains 70%, which suggests that the economy does not operate according to the broad administrative divisions but rather according to local-specific factors and transportation linkages, as is the case in a fragmented country united by its

tive advantages on the basis of human capital, outside Athens and (perhaps) a couple more university and services cities that draw such people from the other parts of the country.

²³ Despite the lack of time-use data, we are inclined to set aside the scenarios of intense work schedules on the grounds that they would not be tolerated by always-vigilant unions, and, thus, attribute the high income result to productivity.

transportation network. Additionally, our analysis of the joint model (Version 3) suggests that the combination of minimal formal education and engagement in the primary sector (or the presence of unemployment) among the indigenous households of rural East Macedonia-Thrace (outside the urban centers of Alexandroupolis and Kavala) yields some of the lowest earnings, especially in the sparsely populated communities with households averaging many members, especially children. By contrast, the highest incomes are observed among households whose membership has acquired tertiary level education, lives in the capital or its suburbs, has access to property-related wealth, is employed in the secondary sector, and has no dependents.

5. CONCLUSIONS AND PROPOSALS

Geographically disconnected from the rest of the EU, and fragmented by its own landscape, Greece consists of clusters and pockets of prosperous communities surrounded by a low-income countryside. A close inspection of people's revenue declarations pertaining to the income sources of 2001 reveals considerable heterogeneity in terms of income-earning opportunities and activities.

The national and EU authorities operate a number of regional development programs intended to raise the standard of living across large territorial units (regions) deemed disadvantaged through infrastructure-oriented and other projects. The continuation or termination of support is based on the (entire) region's level of development as proxied through the region-wide GDP per capita index. However, patterns of the declared average household incomes, at the finer geographic level of municipality and postal district, bear no obvious connection to the traditional regional framework. Additionally, a comparison of econometric specifications indicates that the adopted regional classification not only fails to satisfactorily explain income determination (and disparities) in Greece, but - along with the use of regional averages- may be misleading. It follows that the current regional model cannot well explain how the country functions with respect to local income distribution.

Consequently, it may not be proper to base a development policy on the assumption that such a model is indeed appropriate.

Our econometric results identify four types of communities, listed below in a descending order of prosperity: (a) The conurbations of Athens and Thessaloniki, along with the mineral-extraction, energy-production industrial sites; (b) The urbanized belt around Athens, including the capital's western suburbs and extending to most of continental Attiki and a slice of Central Greece, along with the main nodes of the country's transportation network, and the better-known tourist sites (mostly in the south Aegean) that are also linked to Athens; (c) The periphery of Attiki, and the remaining islands of the South Aegean that are not among the main tourist poles; and (d) The remaining 81.9% of the country, which is mostly rural, and operates with a handicap. These subregions diverge from the rest of the country and are in the highest need of regional programs and locality-specific projects aimed to level the plane field.

There is no string of prosperous townships or prosperous districts running across some identifiable geographic pattern. The evidence reveals that the only identifiable spatial pattern is one of relative affluence spreading from the metropolitan areas and neighboring districts, and the transportation network's main nodes/towns. The picture is complemented by the performance of the few well-known tourist-destinations and a small number of mineral-extraction and energy-production sites. Both groups prosper from their local resources and comparative advantages, and serve as examples of a decentralized development model vis-à-vis the Athenian and Thessalonian cases. Additionally, the recovered spatial coefficients lend support to the view for organizing regional development according to the country's functional economies and not by administrative districts.

The coefficients pertaining to the other variables of the model suggest a number of supplementary effects: (a) Sparsely populated areas are relatively poorer, presumably on account of reduced transactions and the multiplier effects associated with them. (b) Communities that generally consist of large households or average more dependents per revenue declaration are associated with re-

duced levels of average income. (c) The rearing of children is associated with increased income-earnings effort or capacity, which -in turn- helps explain the tendency of couples to have few kids. (d) The concentration of an educated workforce is associated with higher levels of average income, presumably on account of highly-valued tasks and business-projects requiring specialized training, complex work or thinking skills that yield high compensations. (e) There is some indication that the presence of non-EU nationals has a higher effect on average income when compared to the effect generated by the activity of native-born and other EU nationals. However, our data do not allow us to attribute the increased output to a different kind of work-values and productivity, exploitation, or other causes. (e) Unlike past-labor income, property income has a multiplier effect on overall income. This may be attributed to a distinct kind of recipients' behavior that purposefully generates more income, such as entrepreneurial activity and high-yield investment. (f) Unlike the low effects associated with primary and tertiary sectors, the effects from the secondary sector are high. This can be attributed to a higher level of productivity that allows for a higher pay. Given that the regressor is net of regional effects, the estimate is unlinked to any specific industrial community. However, it ties well with (and complements) findings associated with the positive income-effect of key industrial communities. All these make the secondary sector an obvious vehicle for boosting family and national income through an expansion of certain industrial (sub-)sectors and the absorption of unemployed and excess staff from other sectors.

REFERENCES

- Amrhein C.G. (1995). "Searching for the elusive aggregation effect: evidence from statistical simulations." *Environment and Planning A* (27):105-19.
- Armstrong H.W., and Vickerman R.W. (1995). "Introduction." *Convergence and Divergence Among European Regions*. Edited by H.W.Armstrong, and R.W.Vickerman. London: Pion Ltd., pp: 1-21.
- Athanassiou L., Kavadias P., Katochianou D., and Tonikidou P. (1995). *Interregional Analysis and Policies and basic Data per Region and per Department*. [In Greek: Diaperifereiaki Analysi kai Politiki kai basika Stoiheia kata Perifereia kai Nomo.] Athens: KEPE Reports.
- Becker G.S. (1965). "A theory of the allocation of time." *The Economic Journal* (75): 493-517.
- Boeckhout S. and Haverkate R. (1995). "Disparities in the development of people and jobs in European Regions." *Convergence and Divergence Among European Regions*. Edited by H.W.Armstrong, and R.W.Vickerman. London: Pion Ltd., pp: 157-76.
- Bramley G., and Lancaster S. (1998). "Modelling local and small-area income distributions in Scotland." *Environment and Planning C: Government and Policy* (16): 681-706.
- Bramley G., and Smart G. (1996). "Modelling local income distributions in Britain." *Regional Studies* (30): 239-55.

- Browning M. (1992). "Children and household economic behaviour." *Journal of Economic Literature* (30): 1434-75.
- Button K., and Pentecost E. (1999). *Regional Economic Performance within the European Union*. Cheltenham UK: Edward Elgar Publishing Ltd.
- Caldwell S.B., Clarke G.P., and Keister, L.A. (1998). "Modelling regional changes in US household income and wealth: a research agenda." *Environment and Planning C: Government and Policy* (16): 707-22.
- Card D. (1999). "The causal effect of education on earnings." *Handbook of Labor Economics* (Vol. 3). Edited by O.Ashenfelter and D.Card. Amsterdam: Elsevier Science Publishers BV, pp.1801-63.
- Christopoulos D. (2004). "The relationship between output and unemployment: Evidence from Greek regions." *Papers in Regional Science* (83): 611-20.
- Christopoulos D., and Tsionas E. (2004). "Convergence and regional productivity differences: Evidence from Greek prefectures." *The Annals of Regional Science* (38): 387-96.
- EU (2003). *Regions: Statistical Yearbook 2003*. Luxembourg: Office for Official Publications of the European Communities.
- EU (2004a). *Regions - Nomenclature of territorial units for statistics - NUTS - 2003/EU25*. Document KS-BD-04-005-1 exists only in electronic format, accessed via the epp.eurostat.cec.eu.int portal.
- EU (2004b). *The European Structural Funds (2000-2006) – Greece*. Accessed via europa.eu.int/comm/regional_policy/index_en.htm.
- EU (2004c). *Cohesion Policy and its financial instruments*. Brussels: Regional Policy Directorate-General Information and Communication. [Also in: europa.eu.int/comm/regional_policy]
- EU (2005). *General and Regional Statistics*. In electronic format, accessed via europa.eu.int/comm/eurostat.
- Freeman R.B. (1986). "Demand for education." *Handbook of Labor Economics* (Vol. 1). Edited by O.Ashenfelter and R.Layard. Amsterdam: Elsevier Science Publishers BV, pp. 357-86.
- Green A.E. (1998). "The geography of earnings and incomes in the 1990s: an overview." *Environment and Planning C: Government and Policy* (16): 633-47.
- Hamermesh D.S. (1986). "The demand for labor in the long run." *Handbook of Labor Economics* (Vol. 1). Edited by O.Ashenfelter and R.Layard. Amsterdam: Elsevier Science Publishers BV, pp. 429-71.
- Hotz V.J., Klerman J.A., and Willis R.J. (1997). "The economics of fertility in developed countries." *Handbook of Population and Family Economics* (Vol. 1). Edited by M.R.Rosenzweig and O.Stark. Amsterdam: Elsevier Science Publishers BV, pp. 275-347.
- Katz L.F. (1999). "Changes in the wage structure and earnings inequality." *Handbook of Labor Economics* (Vol. 3). Edited by O.Ashenfelter and D.Card. Amsterdam: Elsevier Science Publishers BV, pp. 1463-1555.
- Killingsworth M. (1983). *Labor Supply*. New York: Cambridge University Press.
- Lam D. (1997). "Demographic variables and income inequality." *Handbook of Population and Family Economics* (Vol. 1). Edited by M.R.Rosenzweig and O.Stark. Amsterdam: Elsevier Science Publishers BV, pp. 1015-59.
- Le Gallo J., and Ertur C. (2003). "Exploratory spatial data analysis of the distribution of regional per capita GDP in Europe, 1980-1995." *Papers in Regional Science* (82): 175-201.
- McCall L. (1998). "Spatial routes to gender wage (In)equality: regional restructuring and wage differentials by gender and education." *Economic Geography* (74): 379-404.
- Montgomery M., and Trussell J. (1986). "Models of marital status and childbearing." *Handbook of Labor Economics* (Vol. 1). Edited by O.Ashenfelter and R.Layard. Amsterdam: Elsevier Science Publishers BV, pp. 205-271.
- Nilsson K. (2001). "Migration, gender and the household structure: Changes in earnings among young adults in Sweden." *Regional Studies* (35): 499-511.
- OECD. (2003). *Education at a Glance*. Paris: OECD Indicators.
- OECD. (2004). *OECD in Figures. Statistics of the Member Countries*. Paris: OECD Observer.
- Petrakos G., and Saratsis Y. (2000). "Regional inequalities in Greece." *Papers in Regional Science* (79): 57-74.
- Prodromidis P.-I. (2005). "Estimating women' time use: Based on British survey evidence from 1986-1987." *Applied Economics* (37): 1505-21.
- Rosen S. (1986). "The theory of wage determinants: A survey and reinterpretation of human capital earnings functions.." *Handbook of Labor Economics* (Vol. 1). Edited by O.Ashenfelter and R.Layard. Amsterdam: Elsevier Science Publishers BV, pp. 641-92.
- Rodríguez-Pose A., and Fratesi U. (2004). "Between development and social policies: The impact of European structural funds in objective regions." *Regional Studies* (38): 97-113.
- Schultz T.P. (1997). "Demand for children in low income countries." *Handbook of Population and Family Economics* (Vol. 1). Edited by M.R.Rosenzweig and O.Stark. Amsterdam: Elsevier Science Publishers BV, pp. 349-430.
- Siriopoulos C., and Asteriou D. (1998). "Testing for convergence across the Greek regions." *Regional Studies* (32): 537-56.
- Tsionas E. (2002). "Another look at regional convergence in Greece." *Regional Studies* (36): 603-9.
- Willis R.J. (1986). "Wage determinants: A survey and reinterpretation of human capital earnings functions." *Handbook of Labor Economics* (Vol. 1). Edited by O.Ashenfelter and R.Layard. Amsterdam: Elsevier Science Publishers BV, pp. 526-602.