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## Delineation of local labor markets in Greece on the basis of travel-to-work flows

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# **DELINEATION OF LOCAL LABOR MARKETS IN GREECE ON THE BASIS OF TRAVEL-TO-WORK FLOWS**

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## **Abstract**

The aim of the paper is the delineation of local labor markets in Greece on the basis of the two-way (i.e. incoming and outgoing) travel-to-work flows. The delineation of local labor markets is bound to establish a unit of locality which commands general acceptance as reference for addressing issues of planning and development, as well as issues of labor market, in a manner which is not possible through the conventional, administrative and/or statistical territorial partitions. The identification of the functional linkages, under the prism of territorial hierarchy, that exist among spatial entities, is going to detect relations of interaction, interdependence and overlapping – and also discontinuities – in the Greek territory allowing for a number of research issues to be thoroughly addressed. The analysis is going to utilize the disaggregated travel-to-work flows data, among the 1,034 local administrative units in Greece (i.e. municipalities and communities), solicited in the 2001 Population Census. The aforementioned data are referred to permanent population and include both daily and seasonal travel-to-work flows.

**Key words:** travel-to-work flows, local labour markets, employment poles, functional periphery, employment enclave

**JEL:** R12, J49

## 1. Introduction

Labor does not move only between firms and occupations; labor moves also between geographic areas (Goodman, 1970; Rossi, 1980). The territorial dimension of labor markets, however, has been rather loosely conceptualized (Goodman, 1970; Clark and Gertler, 1983), probably because spatial theories have been developed, to a great extent, separately from the economic ones (Efstatoglou, 1998). The recognition of the “multiplicity of sub-markets” in the real world (Goodman, 1970: 179) necessitates the delineation of local labor markets (LLMs) since the geographical dimension of both the production process and the labor force breeds territorial partitions in the labor market, setting obstacles to – and creating opportunities for – the mobility of (potential) workers (Blanchard and Katz, 1992; Decressin and Fatás, 1995).

The aim of the paper is the delineation of LLMs in Greece on the basis of the two-way (i.e. incoming and outgoing) travel-to-work flows. The delineation of LLMs is bound to establish a unit of locality which commands general acceptance as reference for addressing issues of planning and development, as well as issues of labor market, in a manner which is not possible through the conventional, administrative and/or statistical territorial partition. The identification of the functional linkages, under the prism of territorial hierarchy, that exist among spatial entities, is going to detect relations of interaction, interdependence and overlapping – and also discontinuities – in the Greek territory allowing for a number of research issues to be thoroughly addressed.

The analysis is going to utilize the disaggregated travel-to-work flows data, among the 1,034 local administrative units (LAUs) in Greece<sup>1</sup> (i.e. municipalities and communities) (Map 1), solicited in the 2001 Population Census<sup>2</sup> (National Statistical Service of Greece, 2001) and included in the “Panorama of Census Data 1991 - 2001” database (Greek National Center of

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<sup>1</sup> These were the LAUs in Greece according to the antecedent administrative reform in Greece (Hellenic Parliament, Law 2539/97), known as “Kapodistrias Plan”. On 1/1/2011, the recently enacted administrative reform in Greece (Hellenic Parliament, Law 3852/10), known as “Kallikratis Program”, came into force.

<sup>2</sup> This is the penultimate Population Census held in Greece and the first one that has promulgated data on commuting flows. The latest Population Census in Greece held in 2011 and data are still under elaboration.

Social Research, 2005). The aforementioned data refer to permanent population and include both daily and seasonal travel-to-work flows.

Map 1: Municipalities and communities in Greece prior to “Kallikratis Program”



## 2. Literature Survey

Even though there is an increasing bulk of literature grappled with the issue, still, there is no uniform meaning for the concept of LLMs. The definitions of LLMs as “spatially delineated areas, the boundaries of which are rarely crossed in daily journeys to work, [...] with a high degree of intra-market movement” (Goodman, 1970: 184) and as “geographic areas within which transactions between buyers and sellers of labors are situated and occur on a regular basis” (Horan and Tolbert, 1984: 10) are, probably, the most well-known.

Despite the lack of unanimity on the definition of LLMs, there is unanimity that the geographical dimension of the characteristics of the production process and the labor force, and the corresponding territorial partition of labor markets, set restrictions on (and, also, creates opportunities for) labor supply and demand (Efstratoglou, 2004). It is commonly accepted that in order for a critical threshold of distance from the place of living to the place of working (commuting) to be surpassed, the provision of additional incentives (besides the

ones that employment itself generates) is required. This way, “burdens” that are initially not acceptable (i.e. time consumption, travel cost, change of residence) can be offset or set aside, making a job sufficiently attractive. Even though, the limits of acceptable travel may vary widely over time and with individual circumstances (Kerr, 1954), it is possible to estimate where the main weight of effective local traveling choice lies, and, consequently, to delineate LLMs, given the existing distribution of residences, jobs, and transport, by studying the extent to which workers commute (Smart, 1981).

The scientific literature that falls within the field of the definition of LLMs has been significantly affected from a couple of seminal approaches. The first one is the approach of Hall et al. (1973) who attempted to define the Local Labor Market Areas (LLMAs) of England and Wales, deriving an area known as Metropolitan Economic Labor Area (MELA). MELA comprised a Core (which satisfied specific criteria concerning the number of jobs, job density, and territorial coherence), a Metropolitan Ring and an Outer Metropolitan Ring (depending on the intensity of commuting towards the corresponding Core). One problem with the aforementioned approach, particularly for planners, is that it does not exhaust the available territory. The second one is the approach of Smart (1974) who attempted to define the LLMAs of Great Britain on the basis of the concept of self-containment (i.e. the proportion of an area’s resident employed population working locally and the proportion of an area’s daily employed population living locally) and the strength of a given area’s commuting links with other contiguous areas (using a gravity-type equation). The aforementioned approach is considered to be more appropriate for the definition of LLMAs since it exhausts the available territory, representing, more accurately, the “on-the-ground” commuting behavior.

The aforementioned studies gave a significant bust on the corresponding scientific literature (prior to them, the studies of Myers and Shultz (1951), and Wilcox and Sobel (1958) are worth-mentioning). Indicatively, the studies of Carmichael (1978), Smart (1981), Coombes and Openshaw (1982), and Coombes et al. (1986), for Great Britain; the studies of van der Laan (1991), and van der Laan and Schalke (2001), for the Netherlands; the study of Kristensen (1998) for Denmark; the study of Papps and Newell (2002) for New Zealand; the study of Cavailhès et al. (2004) for France; and the study of Prodromidis (2009) for Cyprus, should be mentioned.

Concerning Greece, the need for the delineation of LLMs has been articulated by Efstratoglou (2006). Up to now, the only study that exists in the field, for the Greek case, has been conducted by Prodromidis (2008; 2010)<sup>3</sup> who attempted to delineate LLMs in Greece based on the two-way (i.e. incoming and outgoing) travel-to-work flows data, at the LAU level, derived from the 2001 Population Census (National Statistical Service of Greece, 2001)<sup>45</sup>. According to the aforementioned study, after the examination of commuting patterns across all 1,034 LAUs (and not around the main urban centers)<sup>6</sup>, a LAU or an iteratively enlarged LLM is grouped with another LAU or LLM in the cases when: (a) at least 15% of its employed residents commute to the other LAU or LLM, and/or (b) at least 15% of all persons employed in the LAU commute from the other LAU or LLM. Under this methodological approach, 667 LLMs can be detected in Greece.

The main point of criticism of the aforementioned study, without querying its overall importance, is that the delineation of LLMs emerges from the partition of the Greek territory after grouping hierarchically equivalent territorial units (into LLMs). Thus, no territorial structure and hierarchy exists inside each LLM, and each LAU can belong only to one LLM. In fact, the possibility of the affiliation of a LAU to more than one LLMs is considered to be “quasi problematic” (Prodromidis, 2008:13). Hence, the facts that it is possible (and rather presumable) for the LLMs to have internal territorial structure and hierarchy, and to display (with each other) relations of interaction, interdependence and overlapping, seems to be overlooked. Ignoring territorial structure and hierarchy, treating, thus, LLMs as isolated

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<sup>3</sup> The 2008 study has been published as a discussion paper.

<sup>4</sup> Using the same data, Duquenne and Kaklamani (2009) attempt to sketch the intensity of mobility from (to) the place of residence to (from) the place of working. The study accentuates the importance of geomorphology, urbanization, specialization, and demographic characteristics as determinants of commuting.

<sup>5</sup> Using the same data, Fotis and Kaklidis (2009) attempt to detect the determinants of intra-prefectural movements for employment and intra-municipal movements for residence, and Arvanitides and Doris (2011) try to determine Functional Urban Areas (FUAs) in Greece. Concerning the latter study, a serious point of criticism is that only the FUAs of the prefectural capitals are determined.

<sup>6</sup> Due to the lack of statistical data, up to 2008 the delineation of LLMs in Greece could only be made by means of the 30 biggest commuting outflows from each municipality.

islands, encumbers the detection of the functional linkages that exist among territorial units both within and between LLMs. This point of criticism refers not only to the aforementioned study but also the vast majority of the studies dealing with the delineation of LLMs (or LLMAAs).

### **3. Description of the Methodology**

The paper is going to delineate LLMs in Greece following a methodological approach that combines the seminal approaches of Hall et al. (1973) and Smart (1974) in order to accentuate the territorial hierarchy and the functional linkages that exist among the 1,034 LAUs in Greece, both within and between LLMs.

The position of each territorial unit in the territorial hierarchy rests on a series of criteria (Table 1). The first criterion has to do with the number of employed population (either living or working locally); the second criterion has to do with the level of retention of workers (i.e. the proportion of an area's resident employed population working locally); and the third criterion has to do with the level of attraction of workers (i.e. the proportion of an area's daily employed population not living locally). The LAUs that fulfill the aforementioned criteria will be considered to be employment poles either of first- or of second-order, depending on the thresholds set. The LAUs that do not fulfill (at least one of) the aforementioned criteria may be affiliated, on the basis of a gravity-type criterion that concerns their commuting links with the employment poles, and depending on the thresholds set, to the first-order employment poles, being either first- or second-level functional zones, and/or to the second-order employment poles, being first-level functional zones. An employment pole, either of first or of second order, with its functional zone (if there is one), either of first or of second level, will be considered to be a LLM. The (remaining) LAUs – that will be neither employment poles nor part of the functional zone of an employment pole – will be considered to be employment enclaves.

Briefly, delineation of LLMs in Greece on the basis of travel-to-work flows among the 1,034 LAUs aiming at define:

- A) First-order employment poles (hereinafter: EPs\_a);
- B) Second-order employment poles (hereinafter: EPs\_b);
- C) First-level functional zones of the first-order employment poles (hereinafter: FZs\_a1);
- D) Second-level functional zones of the first-order employment poles (hereinafter: FZs\_a2);

- E) First-level functional zones of the second-order employment poles (hereinafter: FZs\_b);
- F) Employment enclaves (hereinafter: EEs);
- G) LLMs.

Table 1: Methodology for the delineation of LLMs in Greece: A recapitulation and the relative conceptual definitions.

<b>Retention of employees:</b> the proportion of an area's resident employed population working locally
<b>Attraction of employees:</b> the proportion of an area's daily employed population not living locally
<b>Gravity of employment:</b> the ratio of squares sum of the travel-to-work flows (i.e. incoming and outgoing) between two LAUs to the product of their resident employed populations
<b>Employment pole:</b> a LAU that surpasses a threshold of employed population (either living or working locally), a threshold of retention of employees, and a threshold of attraction of employees
<b>Functional zone of an employment pole:</b> a territorial unit that consists of LAUs that exhibit gravity of employment with the employment pole that surpasses a threshold
<b>Employment enclave:</b> a LAU which is neither an employment pole nor a part of the functional zone of an employment pole
<b>LLM:</b> a territorial unit that consists of an employment pole and its functional zone (if there is one)

Source: Authors' elaboration

A) The criterion for the detection of EPs\_a consists of 3 legs. A LAU must fulfill all legs in order to fulfill the criterion:

- A1) The 1<sup>st</sup> leg of the criterion refers to the minimum number of employed population (either living or working locally). This number is set to be 5,000 employees.
- A2) The 2<sup>nd</sup> leg of the criterion refers to the minimum level of retention of employees. This level is set to be 75%.
- A3) The 3<sup>rd</sup> leg of the criterion refers to the minimum level of attraction of employees. This level is set to be 10%.



B) The criterion for the detection of EPs\_b – among LAUs that are not EPs\_a – consists of 3 legs. A LAU must fulfill all legs in order to fulfill the criterion:

B1) The 1<sup>st</sup> leg of the criterion refers to the minimum number of employed population (either living or working locally). This number is set to be 3,000 employees.

B2) The 2<sup>nd</sup> leg of the criterion refers to the minimum level of retention of employees. This level is set to be 50%.

B3) The 3<sup>rd</sup> leg of the criterion refers to the minimum level of attraction of employees. This level is set to be 7,5%.

C) LAUs that are not EPs\_a may be affiliated to one or more EP(s)\_a, being part of its or their, respectively, FZ(s)\_a1. The criterion that must be fulfilled refers to the minimum gravity of employment exhibited with an EP\_a. This gravity of employment is set to be the average of the gravities of employment exhibited between each pair of EP\_a and a LAU that is not EP\_a (pairs with zero gravity of employment are excluded from the calculation of the average gravity of employment).

D) LAUs that are not EPs\_a may be affiliated to one or more EP(s)\_a (if they are not part of its or their, respectively, FZ(s)\_a1), being part of its or their, respectively, FZ(s)\_a2. The criterion that must be fulfilled refers to the minimum gravity of employment exhibited with an EP\_a. This gravity of employment is set to be the average of the gravities of employment exhibited between each pair of EP\_b and a LAU that is not EP\_a (pairs with zero gravity of employment are excluded from the calculation of the average gravity of employment).

E) LAUs that are neither EPs\_a nor EPs\_b may be affiliated to one or more EP(s)\_b, being part of its or their, respectively, FZ(s)\_b. The criterion that must be fulfilled refers to the minimum gravity of employment exhibited with an EP\_b. This gravity of employment is set to be the average of the gravities of employment exhibited between each pair of EP\_b and a LAU that is neither EP\_a nor EP\_b (pairs with zero gravity of employment are excluded from the calculation of the average gravity of employment).

F) LAUs that are neither employment poles nor parts of the functional zone of an employment pole – since they do not fulfill (at least one of) the criteria that have been set are considered to be EEs.

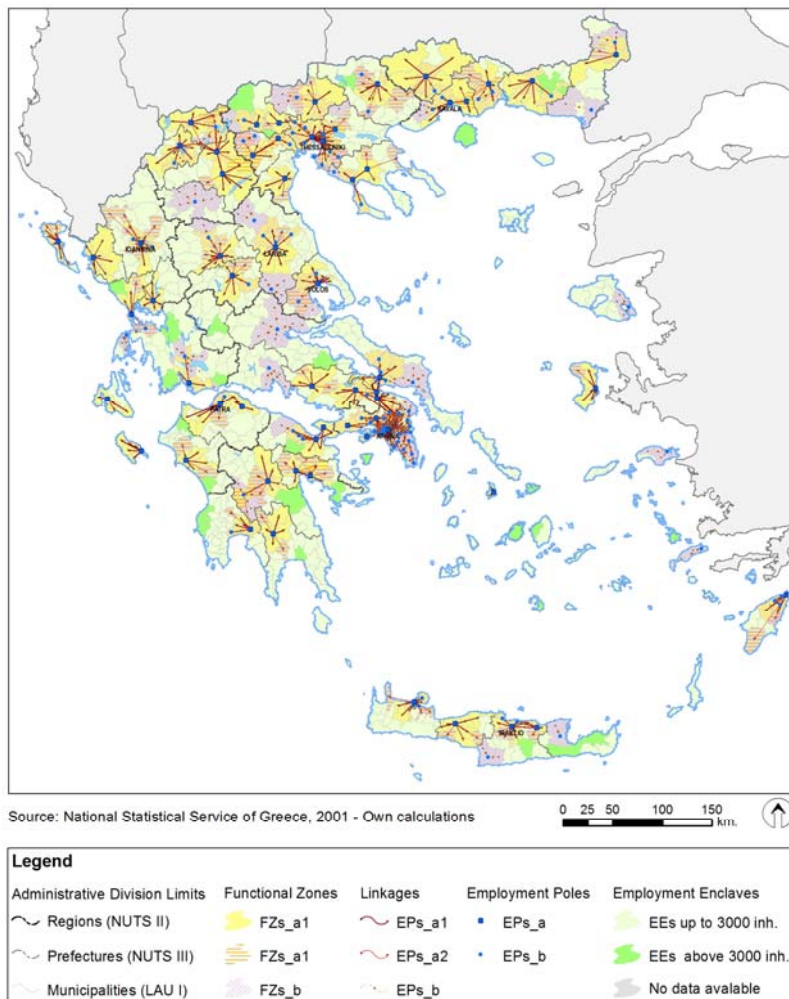
G) The territorial unit that consists of an employment pole and its functional zone (if there is one) is considered to be a LLM.

The implementation of the previously described methodological approach is going to accentuate the fact that the territory of a country can, certainly, not be, simply, considered as the sum of a number of territorial sub-units.

#### 4. Implementation of the Methodology

The implementation of the previously described methodological approach for the delineation of LLMs, among the 1,034 LAUs<sup>7</sup>, in Greece, on the basis of travel-to-work flows, results in the detection of 60 EPs\_a, 90 EPs\_b, 153 (60 + 93) LLMs, and 469 EEs (Map 2)<sup>8</sup>.

Map 2: LLMs in the Greek territory.



The spatial allocation of the EPs\_a seems to follow the erstwhile - prior to “Kallikratis Program” - existing administrative pattern of prefectures (i.e. territorial entities that

<sup>7</sup> Rightly speaking, two Communities, namely Avdella and Grammos, are excluded from the analysis since they don't have resident employed population.

<sup>8</sup> Detailed information regarding the names of LAUs that are either part of a LLM (being either an employment pole or part of its functional zone) or EEs is available upon request.

correspond to NUTS III spatial level and, under “Kallikratis Program”, have no administrative authority).

Out of the 60 EPs<sub>a</sub> in Greece, 40 are prefectural capitals, 13 belong to prefectures whose capitals are EPs<sub>a</sub>, and 7 belong to prefectures whose capitals are not EPs<sub>a</sub>. Out of the 54 prefectures in Greece<sup>9</sup>, 9 have no EP<sub>a</sub>, 33 have 1 EP<sub>a</sub> each (in 3 out of them the EP<sub>a</sub> is not the capital), 10 have 2 EPs<sub>a</sub> each (in 1 out of them – Prefecture of Pella – none of the EPs<sub>a</sub> is the capital), 1 (Prefecture of Thessaloniki) has 3 EPs<sub>a</sub> (Municipalities of Thessaloniki, Echedoron, and Lagkadas), and 1 (Prefecture of Voiotia) has 4 EPs<sub>a</sub> (Municipalities of Thebes, Levadia, Schimatari, and Inofyta).

The 93 EPs<sub>b</sub> are allocated to 39 Prefectures. The majority belong to the Prefecture of Eastern Attiki (14), to the Prefecture of Thessaloniki (9), to the Prefecture of Larissa (5), and to the Prefectures of Evvoia and Dodekanissa (4 each). Worthy of remark, is the fact that 8 out of the 9 Prefectures which they don't have an EP<sub>a</sub>, have at least 1 EP<sub>b</sub>. Accordingly, only 1 Prefecture (Evrytania) has neither an EP<sub>a</sub> nor an EP<sub>b</sub>. Recapitulating the facts, there are 31 Prefectures that have both EP(s)<sub>a</sub> and EP(s)<sub>b</sub>, 14 Prefectures that have only EP(s)<sub>a</sub>, 8 Prefectures that have only EP(s)<sub>b</sub>, and 1 Prefecture that has no employment pole.

The fact that some Prefectures are multi-polar and some others are not, as well as the fact that employment poles of different order co-exist in the same Prefecture, raises questions concerning the articulation of the employment poles and the boundaries of their influence. The aforementioned questions can be surveyed in the context of LLMs. The 60 LLMs that have an EP<sub>a</sub> present an intense variation concerning the number of LAUs that comprise their functional zones, ranging from the 2 LAUs that comprise the functional zones of 8 EPs<sub>a</sub> to the 8 LAUs that comprise the functional zone of the Municipality of Athens. The majority of the aforementioned 60 LLMs consist of LAUs that belong to the same Prefecture. There are 11 LLMs, however, that consist of LAUs that do not belong to the same Prefecture (i.e. the employment pole and at least 1 LAU does not belong to the same Prefecture). These are mainly the cases with the LLMs situated in the area of Attiki and Voiotia (i.e. the LLMs

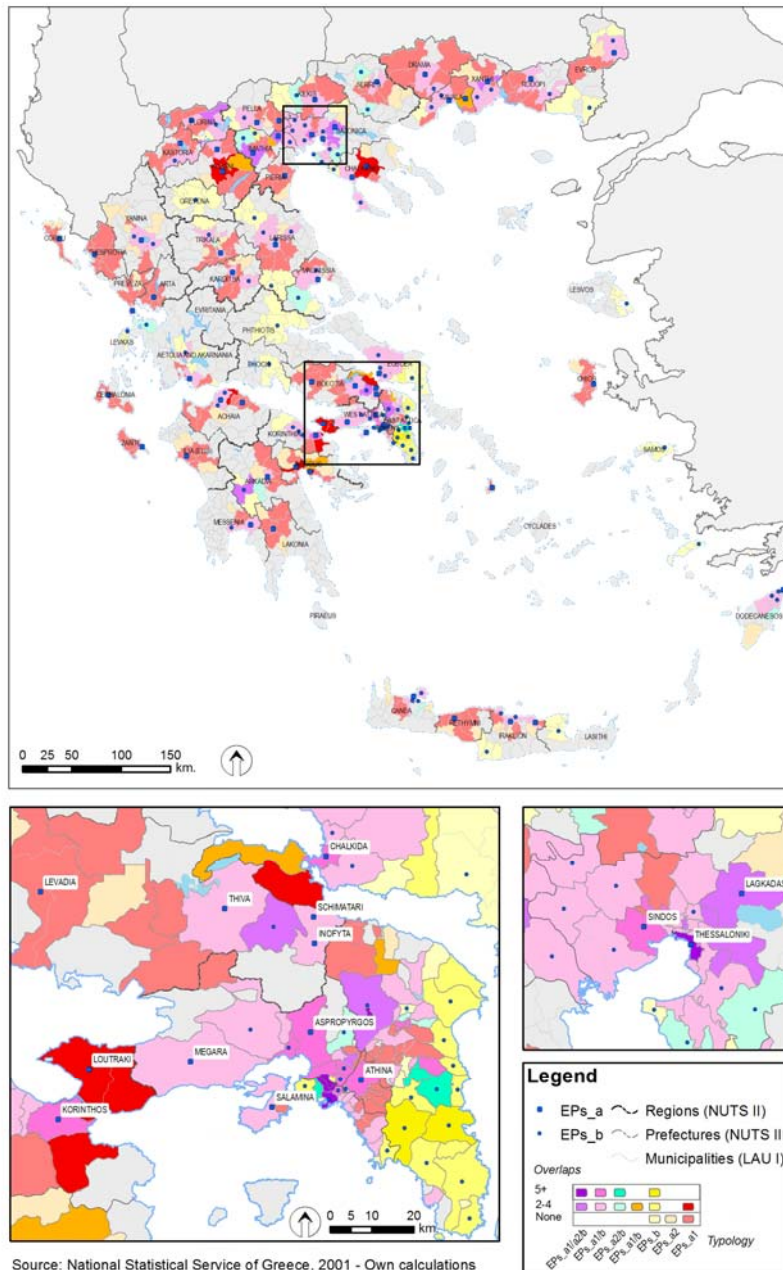
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<sup>9</sup> According to EUROSTAT, there are 51 NUTS III regions. For administrative purposes, the NUTS III region of Attiki had been split into 4 prefectures, namely Athens, Piraeus, Eastern Attiki, and Western Attiki. Besides, the 54 prefectures, the self-governed area of Agio Oros is included in the analysis.

whose employment poles are the Municipalities of Athens, Aspropyrgos, Thebes, Inofyta, and Schimatari).<sup>10</sup>

Taking into account the overlapping of the LLMs, it emerges that the methodology suggested is useful both for the investigation for the existence of greater LLMs grids and for the interpretation of the relations / flows between the urban and the peri-urban space (Map 3).

Map 3: Overlapping of LLMs in the Greek territory



<sup>10</sup> These are also the cases with the LLMs whose employment poles are the Municipalities of Arta, Drama, Kalamata, Kastoria, Preveza, and Ptolemaida.

On the basis of the methodology suggested for the delineation of LLMs in Greece, the 87% of the economically active population and the 52.2% of the territory is overlapped (Table 2). In fact, the 59.1% of the economically active population lives in LAUs overlapped with at least 2 other LAUs (even though in terms of area, the corresponding figure reaches just the level of 17.8%). Worthy of remark, is, also, the fact that 75% of the economically active population live in LLMs that have an EP\_a.

Overlapping among LLMs can be detected in great intensity mainly between FZs\_a1 and FZs\_b (it concerns LAUs that correspond to 42.5% of the economically active population). In contrast, overlapping between LLMs with EPs\_a can't be detected in great intensity (it concerns LAUs that correspond just to 3.4% of the economically active population). By and large, the pattern of overlapping is depended on three factors: (a) the density of residential grid and the existence of (rather) large urban centers (of the same functional order) in small time-distance *inter se* (e.g. the urban complexes of Argos-Nafplio, Kozani-Ptolemaida, and Kavala-Xanthi), (b) the existence of employment poles associated with manufacturing, labor-intensive, activities (e.g. industrial areas of Inofyta and Echedoron-Sindos), and (c) the deployment of small/medium residential centers with loose functional connection with metropolitan concentrations – an outcome of urban sprawl – (e.g. areas of Mesogeia in Attiki, and of Eastern Thermaikos in Thessaloniki).

The thorough examination of the spatial structure of the LLMs in Attiki (Map 4) and Thessaloniki (Map 5) (i.e. Greece's metropolitan areas) accentuates their dynamism, which concerns both the density of their functional linkages and the boundaries of their influence. In both cases, the importance of industrial centers (i.e. Municipalities of Aspropyrgos and Echedoron, respectively) is evident since they constitute employment poles which “penetrate” into the functional zones of the metropolitan centers (i.e. Municipalities of Athens and Thessaloniki, respectively). Particularly in the case of Attiki, a similar, even though at a smaller scale, phenomenon concerns the industrial centers of the Prefecture of Voiotia. Moreover, both Attiki and Thessaloniki include peri-urban employment poles, even though of smaller range (Municipalities of Megara and Salamina<sup>11</sup>, and Municipality of Lagkadas, respectively). The metropolitan area of Attiki is characterized by a fairly wide zone east (i.e.

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<sup>11</sup> The affiliation of the Municipality of Piraeus to the Municipality of Salamina (as FZ\_b) constitutes a special case that has to do with the fact that the former does not fulfill the criterion of the retention of employees (in order to be an EP\_a).

the area of Mesogeia), which has neighboring EPs\_b without noticeable functional linkages with the metropolitan center. The same applies to metropolitan area of Thessaloniki, where the areas located in the east are EEs (and not employment poles). Finally, the metropolitan area of Attiki includes some EPs\_b within the urban complex of Athens (i.e. Municipalities of Agios Ioannis Rentis, Egaleo, Piraeus, Perama, Peristeri, Tavros). Analogous phenomenon does not occur in the metropolitan area of Thessaloniki since the majority of EPs\_b (with the exception of the Community of Efkarpia) are located outside the urban complex.

Table 2: LLMs overlapping, in terms of area and economically active population, at the level of LAUs

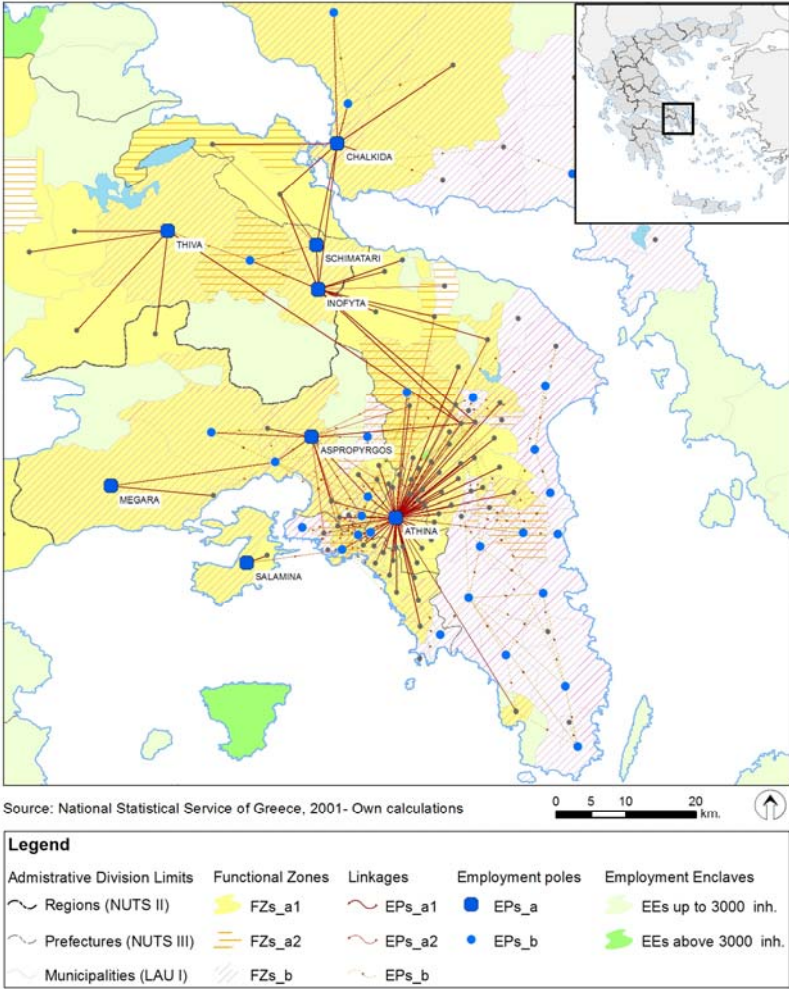
<b>Overlapping</b>	<b>LLMs Typology</b>	<b>Area*</b>	<b>Economically Active Population</b>
No	EP_a1	19.4%	20.5%
overlapping	EP_a2	5.5%	2.0%
	EP_b	9.4%	5.4%
	Partial Sum	34.4%	27.9%
Overlapping between employment poles of the same order	EP_a1	1.3%	1.3%
	EP_a2	0.0%	0.0%
	EP_b	0.8%	2.1%
	Partial Sum	2.1%	3.4%
Overlapping between employment poles of different order	EP_a1 – EP_a2	0.8%	0.4%
	EP_a1 – EP_b	11.5%	42.5%
	EP_a1 – EP_a2 – EP_b	1.5%	10.6%
	EP_a2 – EP_b	1.9%	2.2%
	Partial Sum	15.7%	55.7%
Total overlaps		17.8%	59.1%
LLMs		52.2%	87.0%
EEs		47.7%	13.0%
Greek territory		99.9%	100.0%

\* extensive water surfaces are excluded

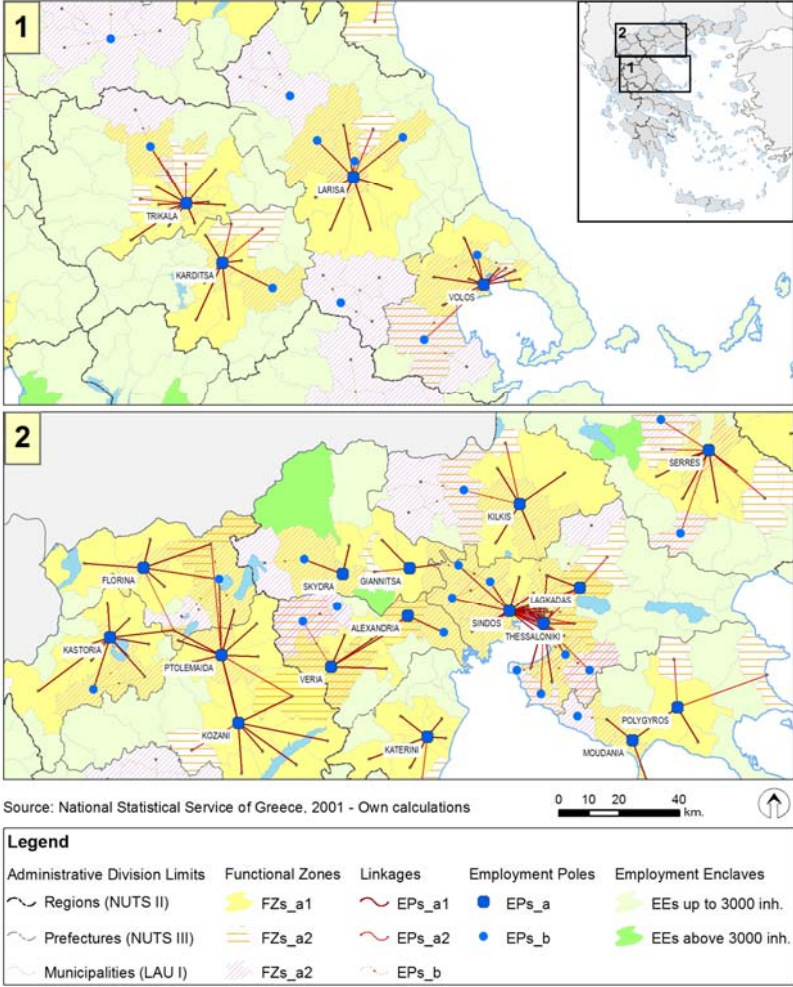
Source: Authors' elaboration

Examining the spatial structure of the LLMs located outside the metropolitan areas of Attiki and Thessaloniki, worthy of remark is the fact that the LLMs in the Region of Thessaly accentuate a spatial pattern that reminds of the one described in the context of the theory of central places (Christaller, 1933; Lösch, 1954). The main urban centers of the Region (i.e. Municipalities of Larissa, Volos, Trikala, Karditsa) are EPs\_a with distinctive, non-intersecting, functional zones. EPs\_b are difficult to develop their own functional zones, being parts of the functional zones of the EPs\_a (the Municipality of Farsala and, to a lesser degree, the Municipalities of Almyros and Kalampaka are excluded).

Map 4: LLMs in the metropolitan area of Attiki



Map 5: LLMs in the metropolitan area of Thessaloniki and in the Region of Thessaly



Concerning the EEs, their spatial distribution shows a clear clustering along the mountainous, in the continental Greece, and the insular LAUs. EEs are typically identified at a distance from employment poles, particularly near prefectural boundaries. Only 1 out of the 54 Prefectures (Prefecture of Zakynthos) has no EE. Also, only in 1 out of the 54 Prefectures (Prefecture of Evrytania) all LAUs are EEs. Given the strong association of the spatial organization of the LLMs with the spatial organization of the Prefectures, the differentiation of the latter in terms of the percentage of the EEs in the total number of LAUs is an indicator of the degree of the functional linkages between the respective employment poles with their hinterlands. The relatively high percentage of EEs in the Prefectures of Ileia and Messinia, for example, reveals the low degree of the functional linkages between the employment poles of Pyrgos and Kalamata, respectively, with their hinterlands. In contrast, the relatively low



percentage of EEs in Prefectures such as Attiki, Thessaloniki, Rethymno, Chios, Igoumenitsa, Florina, and Kavala reveals the exact opposite situation.

## 5. Conclusions and Issues for Further Research

The paper delineates LLMs in Greece on the basis of the two-way (i.e. incoming and outgoing) travel-to-work flows. In contrast to methodologies used in previous studies, the present methodology, under the prism of territorial hierarchy, identifies the functional linkages that exist among spatial entities, detecting relations of interaction, interdependence and overlapping – and also discontinuities – in the Greek territory. The implementation of the methodology suggested results in the detection of 60 EPs\_a, 90 EPs\_b, 153 (60 + 93) LLMs, and 469 EEs.

The findings of the paper allow for a number of research issues to be thoroughly addressed. *Inter alia*, these are: (a) the understanding of the adjustment mechanisms triggered by territorial-specific shocks, (b) the production of a typology based on travel-to-work flows, (c) the evaluation of the “Kallikratis Program” (i.e. whether – and to what extent – the emerging administrative territorial units coincide with the LLMs), (d) the indirect estimation of the regional equivalent of the GNP, (e) the examination for the existence of spillover and multiplicative effects between the LLMs, and (f) the examination for the operation of dipoles or multipoles in the Greek territory.

The delineation of LLMs in Greece establishes, indeed, a unit of locality which commands general acceptance as reference for addressing issues of planning and development, as well as issues of labor market, in a manner which is not possible through the conventional, administrative and/or statistical territorial partition.

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**Acronyms**

FUA = Functional Urban Areas

GNP = Gross National Product

LAU = Local Administrative Unit

LLM = Local Labor Market

LLMA = Local Labor Market Area

MELA = Metropolitan Economic Labor Area

NUTS = Nomenclature of Territorial Units for Statistics