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TRACK P. LEISURE, TOURISM AND REGIONAL DEVELOPMENT

AN ESTIMATION OF TOURISM DEPENDENCE IN FRENCH RURAL AREAS

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Abstract:
This paper intends to estimate the importance of tourism in the economy of rural areas. Considering previous analyses of rural dynamics, this paper 1) focuses on tourism activity, 2) analyzes the situation of Functional Economic Areas, and 3) takes into account socioeconomic indicators as well as landscape features. Based on secondary data, resource-like regions are defined, the local share of tourism employment is estimated, stylized facts regarding tourism indicators by cluster are produced, tourism-dependent FEAs are identified,

and the relation between, on one hand, tourism indicators and resource variables, and on the other hand, regional growth indicators and tourism dependence, is studied.

Keywords:
tourism, economic dependence, rural areas, regional development, France

JEL classification:
L83; R11; R12; R14

Résumé:
Une estimation de la dépendance au tourisme dans les espaces ruraux français
Cette contribution a pour objectif d'estimer l'importance du tourisme dans l'économie des espaces ruraux. Par rapport aux contributions précédentes sur les dynamiques rurales, cette communication 1) cible l'activité touristique, 2) analyse la situation des bassins de vie, et 3) prend en compte des caractéristiques paysagères ainsi que des indicateurs socioéconomiques. Les régions similaires en termes de ressources sont regroupées en clusters, pour lesquels on estime la part locale de l'emploi touristique, par la technique du besoin minimal, et on dégage des faits stylisés concernant les indicateurs de tourisme. Pour l'ensemble des bassins de vie ruraux, on analyse enfin la relation entre, d'une part, indicateurs de tourisme et variables de ressources, et d'autre part, indicateurs de croissance régionale et dépendance au tourisme.

Mots clés:
tourisme, dépendance économique, espaces ruraux, développement régional, France

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AN ESTIMATION OF TOURISM DEPENDENCE IN FRENCH RURAL AREAS

I. Introduction

Concurrent with a trend of increasing mobility, tourism is developing; are considered tourists people who stay in places outside their usual environment for at least one night. This activity results in trips, to which corresponds a set of goods and services –lodging, transportation, eating and drinking, personal services, and recreation services. The economic sector thus made up is difficult to define precisely, because some of the related activities are not exclusively used for tourism consumption. This is particularly obvious in the case of regions with a significant residing (permanent) population and a significant visiting (temporary) population: even if the analysis is focused on final consumption, isolating tourism jobs is not easy. This "quasi-sector" plays an increasingly important role in the national economy, however, and is becoming strategic to the development of some areas. Such is the case of many rural areas for which hosting functions in general, and tourism functions in particular, are today the chief factors of economic growth.

With a shift away from traditional extractive and manufacturing activities, tourism indeed is becoming a growth factor for rural economies. On the demand side, there is an interest for nature and landscape attributes that are associated with healthy and quiet living conditions. Including environmental variables in hedonic pricing models shows an impact of site characteristics on rural lodging rental prices (Mollard et al., 2006). On the supply side, tourism economic features are *a priori* compatible with rural factor endowments. Indeed, there is a model of the tourism firm that uses significant low-skilled labor but little capital and technology, while adding value to fixed "natural" assets (Eadington and Redman, 1991). This model matches rural entrepreneurship relatively well, because it is based on family heritage and labor and creates micro-activities that are adapted to diversification and household pluriactivity. There is also a capital intensive, high-skilled labor model that is found in tourism resorts; this model is often met in mountain or seaside areas, but relatively nonexistent in "ordinary" rural areas (except as leisure parks).

Thus, the type of tourism that is developing in rural areas is mainly extensive and based on natural features of the locales. In a regional development perspective, the economic analysis of this type of tourism involves three complementary dimensions: i) conditional factors that are associated with public goods, ii) setting up a global offer for a given site, and iii) domino effects on the local economy.

First, rural tourism adds value to fixed assets that have a local public good status. Nature goods are strictly localized and their management, be that from the perspective of protection or development, associates rights and uses for which the public sphere plays a major role. Moreover, tourism growth increases consumption of local public services, which can be significant relative to the permanent resident population, and may require adding new capacity or complementary utilities. This conditional set[1] is not a strict precondition for the existence of tourism activities because a given level of under-development or isolation can be a source of attraction for pioneering activities. The development of a significant tourism activity, both in terms of jobs and income, however, will take place only if public services are in place and local amenities are maintained and available.

[1] Note that the development of any area assumes elementary conditions of accessibility.

The second dimension relates to the way a global offer is constituted from fragmented micro-projects. Apart from resorts, which are planned and built in an integrated manner, rural tourism is the result of the aggregation of individual initiatives that are more or less influenced by a common reference –in the context of a *pays d'accueil touristique*[2] for instance. The issue is that of completeness of the offer from a tourism consumption viewpoint. As much as competition may adjust the supply of site goods and services, nothing guarantees the implementation of secondary functions (such as cultural activities) over a reasonable time span. Moreover, territorial cohesion implies that user conflicts and competition over access to fixed asset have been solved. Thus, the overall regulation of the site's offer has to be dealt with, which raises the issue of the definition of the relevant perimeter for such a collective action.

Third, once tourism activities are in place, the question becomes that of their impact on the regional economy. In addition to direct tourism jobs, one must take account of potential indirect jobs (in economic sectors that have industrial relations with tourism activities *per se*) and induced (in sectors that benefit from increased demand resulting from income changes due to tourism activities). The analysis of indirect jobs requires using input-output models in order to assess inter-industrial relation coefficients for every economic sector in contact with the tourism sector. The analysis of induced effects rests on the estimation of a multiplier that calculates demand changes in various activities of the residentiary sector, following an exogenous shock that changes income flows in the regional system[3]. These two methods are sensitive to the size of the considered region and to the degree of integration of the given economy (see Vollet, 1998).

Objectives of the paper focus on identifying the importance of tourism activities in rural areas. To locate those areas that are tourism-dependent, first there is a need to identify tourism-related jobs. The level of tourism activity thus assessed is analyzed with respect to, on one hand, the role of natural resources, and on the other hand, local growth. In order to take account of the regional effects mentioned before, a chief methodological choice consists in working with Functional Economic Areas (FEAs, *bassins de vie*). The remainder of the paper is organized as follows. Section 2 presents efforts to define rural tourism in both the French and the North American literature. Section 3 presents data and methods. Results, which are presented and discussed in section 4, establish a classification of FEAs according to natural resource criteria and estimate their sensitivity to various context variables, including local economic impacts. The conclusion outlines study limits and further research topics.

II. Literature review

The definition of tourism that is most frequently used is based on the consumption of tourists, that is, people who travel to places other than their usual place of residence for a period of not less than 24 hours or one night for leisure, business, family and other purposes. If one follows the example of other economic sectors, a definition may be suggested using the set of goods and services supplied by the branch: "Tourism is the aggregate of all businesses that directly provide goods or services to facilitate business, pleasure, and leisure activities away from the home environment" (Smith, 1988; 183). This supply-side approach is more appropriate for regional analyses that aim at differentiating areas in terms of tourism activity (and employment in particular).

[2] An area with a multimunicipal organization (such as an association) that brings together all stakeholders in order to set up and implement a tourism development project.
[3] Additional income due to tourist spending is considered exogenous.

The definition of rural tourism is problematic because the usual rural-urban distinction (e.g., urban area zoning) is not sufficient. It must be supplemented by a second classification that takes account of the nature of tourist destinations. Major tourism-related organizations thus make a distinction between city, seaside, mountain, and countryside tourism, the latter comprising leftovers from the first three. According to this typology and data from the Ministry of tourism regarding trips for personal purposes (Direction du Tourisme, 2006), "countryside" tourism is equivalent (in terms of number of nights) to "city" tourism (around 30%), before "mountain" tourism (20%), but behind "seaside" tourism (40%)[4]. In terms of full-time equivalent jobs, however, the picture is different (Baccaïni et al., 2006): urban tourism accounts for over 48% of total tourism jobs, followed by seaside (23%), then rural (19%), then mountains (9.5%, including resorts). If the share of local employment in tourism is considered, then rural tourism is on par with urban tourism: around 3% (Baccaïni et al., 2006). In the countryside, tourism activities tend to be associated with relatively short stays and importance of family and friend contacts.

More generally, taking account of tourism in rural development analysis leads to refine the notion of residentiary economy. The definition of FEAs (INSEE, 2003) takes the classic typology a step further by distinguishing agrifood (agriculture as well as agrifood processing), manufacturing and residentiary specializations. FEAs specialized in residentiary (i.e., in which at least 50% of the jobs are in the corresponding activities) are differentiated according to the importance of tourism. Using a lodging capacity criterion relative to the resident population (ratio > 1.5), about 10% of FEAs feature a residentiary-touristic specialization. Studying the situation of rural areas on a municipality (commune) basis, Aubert et al. (2006) provided a summary classification and differentiated three types of communes for which tourism is significant: "non performing soft tourism", "attractive tourist sites", and "tourism economies with uncertain performance". Differences are due to the spatial organization of tourism activities (spread vs. polarized), and to the performance of corresponding economies, in terms of employment in particular (i.e., not systematically vigorous and often precarious). The results of this descriptive analysis match those of others that tend to question the impact of tourism activities on rural economic development (Dissart, 2005). In this perspective, a comparison of the French vs. American situations is interesting.

In order to provide relevant information to policymakers, researchers and public officials, the Economic Research Service of the U.S Department of Agriculture has created a typology[5] that includes recreation activity among seven overlapping categories of policy-relevant themes: 1) housing stress, 2) low-education, 3) low-employment, 4) persistent poverty, 5) population loss, 6) nonmetro recreation, and 7) retirement destination. The nonmetro recreation category comprises 334 counties, that is, 16% of rural counties (USDA-ERS, 2005). This designation is based on a combination of factors, including share of employment or share of earnings in recreation-related industries in 1999, share of seasonal or occasional use housing units in 2000, and per capita receipts from motels and hotels in 1997.

The "nonmetro recreation" type is actually an update and an extension of the pioneering work of Beale and Johnson (1998) who identified 285 recreational counties using two types of

[4] As several destinations may be reached over a single trip, total is greater than 100%.

[5] The typology (USDA-ERS, 2005) classifies all U.S. counties according to six non-overlapping categories of economic dependence, primarily established on the basis of the share of annual labor and proprietors' earnings from a given sector over the 1998-2000 period. Thus are distinguished the following dependence categories: farming, mining, manufacturing, government (Federal/State), and services (the last category comprises nonspecialized counties).

criteria. On one hand, empirical criteria : 1) share of employment and income in recreation services (lodging for the most part), share of seasonal or occasional or recreation housing, with a value on two of these three variables greater than two-thirds of a standard deviation above the national mean, or 2) lodging revenues per capita greater than 100$. On the other hand, a context criterion –the presence of recreation activity- in order to remove observations that reflect a significant trip activity but without a recreation objective. Using guide books or maps, Beale and Johnson (1998) were able to remove clusters of motels and restaurant located on major East-West highways, where indeed travelers do not stay for recreational activities.

Following Beale and Johnson (1998), but also Leatherman and Marcouiller (1996), English et al. (2000) analyzed tourism dependence and estimated its effects on U.S. rural counties. In order to take account of structural differences in resources, cluster analysis was used to group similar counties with respect to population density, distance from metropolitan areas, and the proportion of county area in cropland, forests, range/pasture, and mountains. In each cluster, they estimated the share of "export" employment, making a distinction between tourism stays (based on resources) and other stays (business or family related), by using data on four economic sectors: lodging, eating and drinking, recreation services and retail trade. In particular, the share of export employment in tourism-sensitive sectors was estimated by regression analysis, taking account of recreation resources that were grouped in four categories (urban, land, water and winter resources) by principal components analysis. Last, they defined tourism dependent counties as those that had more than double the national percentage for tourism jobs and income, and compared them to other rural counties with respect to several indicators (income, population, economic structure and housing). Tourism dependent counties experience greater increases in population growth and housing construction than other rural counties.

III. Data and methods

1. Data

Units of analysis are rural FEAs (*bassins de vie*). FEAs are aggregates of communes and defined as the smallest area over which its population has access to both services and employment (INSEE, 2003). Among the 1,916 FEAs defined over the French metropolitan territory, 1,745 correspond to small town FEAs, i.e., rural FEAs (Julien, 2007). FEAs were chosen because they correspond more to economic reality than purely administrative boundaries, and they offer a satisfactory amount of data for a relatively fine scale.

Generally speaking, the analysis is based on methods used in North American works and data prepared by French studies, with two major categories. On one hand, natural resource data, which were mainly collected from the European database Corine Land Cover. The CLC2000 database provides a biophysical inventory of land cover that is based on satellite images for the year 2000. Land covers are sorted according to a hierarchical nomenclature arranged in three levels and 44 classes, with 5 major types of land cover: artificial surfaces, agricultural areas, forests and semi natural areas, wetlands, and water bodies. Land cover attributes were overlayed with a commune grid, which yielded area values per commune for every land cover class. These values were then aggregated at the FEA level, and then divided by FEA total area in order to get relative values of land cover for all CLC classes.

As topographic variation is a source of attractiveness (see, e.g., McGranahan, 1999), a corresponding variable was created using INSEE data: the difference between the altitude of the FEA's main commune's city hall and the maximum altitude over the FEA.

On the other hand, socioeconomic data, including tourism indicators, were collected from several sources. Tourism indicators are of two types: the commune's tourism lodging capacity, and tourism employment. The former was operationalized with three variables: number of hotel rooms and campground spaces (INSEE website) and second-homes (Direction Générale des Collectivités Locales); to get a relative measure, these variables were divided by the corresponding FEA's total area. Data on tourism employment were collected from the Unedic website. Data on paid employment are available from the year 1993 on, for several geographic scales (from commune to district) and several levels of economic sector nomenclature (from NES 16 to NAF 700). Commune data on total employment and tourism sector employment (see Box 1) were downloaded at the NAF 700 level for the year 2003.

Box 1. Tourism sensitive activities

INSEE and the Ministry of Tourism have identified 15 tourism sensitive activities that satisfy tourists' needs. In the French Activity Nomenclature (NAF rev. 1, 2003), these activities are classified as follows:

- Lodging: tourism hotels with a restaurant (551A); tourism hotels without a restaurant (551C); other hotels (551E); youth hostels (552A); campgrounds (552C); other tourism lodging (552E)
- Restaurants and cafes: traditional restaurants (553A); fast-food restaurants (553B); *cafés tabacs*[6] (554A); bars (554B)
- Other activities: cable cars, ski lifts (602C); travel agencies (633Z); beauty salons (930E); thermal and thalassotherapy activities (930K); other body care (930L)

Employment in these sectors was aggregated at the FEA level, then divided by total area employment in order to get a proportion of tourism employment for every FEA. To account for structural differences between FEAs, these values were then refined using the minimum requirements method (see next section).

To model the influence of tourism dependence on regional indicators, other socioeconomic variables were retained for the analysis:
- Dependent variables: population, employment, income. Regarding the latter, there was no information for 1,550 communes (included in the 1,745 rural FEAs) with fewer than 10 (taxable or not) households.
- Control variables: demographic composition (share of population aged under 20 or over 60); proportion of employment in the three major economic sectors (agriculture and agrifood processing, manufacturing, residentiary); access time to the closest urban core; and a global score that reflects the presence of jobs and services (see INSEE, 2003). Indeed, five weighted components (with a 0-4 value range) make up a global score for each FEA: 1) score on competing services (e.g., supermarket), 2) score on non competing services (e.g., police force), 3) score on education services (e.g., high school), 4) score of health services (e.g., physician), et 5) score on job offers. The latter, which is critical to define the boundaries of the FEA, is given a weight of 8 (out of 20) in the calculation of the global score.

Thus, the analysis was done using data for the years 1999 (population census), 2000 (Corine Land Cover) or 2003 (tourism indicators), unless otherwise indicated.

[6] Cafes where tobacco is sold.

2. Methods

The analysis was carried out in several steps: 1) clustering of FEAs according to resources; 2) estimation of tourism employment in clusters (using the minimum requirements technique); 3) production of stylized facts for formed clusters; 4) identification of tourism dependent FEAs; 5) estimation of the impact of resources on tourism indicators; and 6) estimation of the impact of tourism dependence on regional development indicators.

First, in order to work with similar FEAs from the perspective of landscape features, a cluster analysis of resources was performed. To get a distribution of FEAs over major types of resources and to account for the sensitivity of cluster analysis to variable correlation (implicit weight), CLC classes were grouped. First, an analysis done with the 5 major land covers identified in CLC showed that in rural FEAs, the vast majority of land is covered by agricultural areas (63.8%) and forests and semi natural areas (29.9%), the remainder being split between artificial surfaces (5%), water bodies (0.8%) and wetlands (0.5%). To get a finer distribution of land covers were distinguished: 1) within agricultural areas, arable land (31%) and other agricultural uses of the land (permanent crops, pastures, heterogeneous agricultural areas: 33%), and 2) within forests and semi natural areas, forests (24%) and semi natural areas (scrub, herbaceous, little or no vegetation: 6%). As the analysis showed a high level of correlation between semi natural areas and topographic variation, the former was dropped, but category 3.3.1 (beaches, dunes, sands) was added to the wetlands category because of a high level of correlation between the two.

To account for the local weight of the residentiary economy, and because the minimum requirements technique assumes similar economic structures, population was added to the set of clustering criterion variables[7]. As variables were measured in different units, they were standardized to a mean of 0 and a standard deviation of 1.

Cluster analysis was done using the fastclus procedure in SAS®, which yields disjoint clusters from a large number of observations over quantitative variables. This method, often called k-means, uses Euclidean distances, with a least squares estimation of cluster centers. Each iteration of the algorithm reduces the least squares criterion until convergence is achieved; cluster centers are then the means of the observations that are assigned to each cluster.

The final number of clusters was decided on the basis of several empirical criteria, including pseudo F and cubic clustering criterion values (local or global maximum value, or a significant change in the values of these statistics), value (and change in value, in particular when the gain becomes less than 5%) of the R^2.

Then, final formed clusters were described using the values taken by the clustering criterion variables on the coefficient of variation statistic (standard deviation/mean*100). A low value of the coefficient of variation indicates non dispersion of values of a clustering variable, hence a salient feature of the considered cluster.

The second step of the analysis involved estimating the share of tourism jobs within clusters. Those are relatively easy to identify whenever corresponding activities depend exclusively on tourism demand (hotels or ski lifts, for example); but tourism jobs are more difficult to count when activities satisfy both tourists and local population demand (retail stores or restaurants,

[7] Note that area is correlated with population, and population density is proxied by the share of artificial surfaces within a given FEA.

for instance). Several techniques exist to estimate the level of employment that satisfies tourism demand, that is, the surplus of jobs that results from the regular or seasonal presence of tourists (Terrier et al., 2005). One such technique is the location quotient which uses, as a benchmark, a geographic (also economic) scale that is greater than the unit of analysis; for example, the administrative region or the nation relatively to the FEA. Another technique is the minimum requirements, which uses as a reference a scale that is identical to the unit of analysis (Ullman, 1968). The assumption is that similar regions exhibit similar consumption patterns and export propensities. Within a given cluster, the FEA that presents the minimum employment value in tourism sensitive activities is assumed to satisfy local demand only, i.e., the value of tourism export employment is considered nil. In other FEAs, the share of export employment is equal to the difference between the share of employment in tourism sensitive activities and the minimum value observed for the cluster: all FEAs, except for the minimum, are exporters in order to satisfy non resident demand (Leatherman and Marcouiller, 1996).

Consequently, the formula to estimate the share of tourism export employment for FEA *i* in cluster *j* is the following:

$$EX_{ij} = (et_{ij} / eT_{ij}) - \min (et_{ij} / eT_{ij})$$

Where EX_{ij} is the share of tourism export employment for FEA *i* in cluster *j*; et_{ij} is the level of tourism employment for FEA *i* in cluster *j*; eT_{ij} is the level of total employment for FEA *i* in cluster *j*; and min (.) is the minimum function that identifies the minimum value of the et_{ij}/eT_{ij} ratio for all FEAs *i* in cluster *j*.

Stylized facts for clusters were produced based on cluster analysis and the estimation of tourism employment, i.e., values taken by clustering variables and tourism indicators in the formed clusters, including tests for differences between means to assess the significance of differences potentially observed.

Fourth step: the identification of FEAs specialized in "tourism". Following English et al. (2000), we used a value that is greater than twice the national average as an indicator of dependence. Lodging and employment variables were combined with the following decision rule: a rural FEA is identified as tourism specialized (or dependent) if it exhibits a value for the proportion of tourism export employment that is greater than twice the national average AND a value for the density of hotel rooms OR campground spaces OR second-homes that is greater than twice the national average. A related dummy variable for tourism dependence was created, so that each rural FEA may be considered as specialized in tourism activity or not.

Last steps: regression analysis was used to estimate impacts. On one hand, in order to assess the impact of resources on tourism indicators, each indicator (employment, hotel room, campground space, second-home) was regressed on clustering variables. On the other hand, to assess the impact of tourism dependence on regional development indicators, classic indicators (population, employment, income) were regressed on the tourism dependence dummy and a set of control variables[8] (demographic composition of the FEA, its economic

[8] Due to a high correlation level between the proportion of aged and young population ($|\rho| > 0.91$), the latter was dropped from the specification (priority was given to the variable that reflects the potential importance of amenity retiree migration). Likewise, a high level of correlation between share of manufacturing employment and the two other sectors (residentiary services in particular, with $|\rho| > 0.68$) led to removing this variable from the specification of regression models.

structure, its distance from the closest urban core, and its profile in terms of access to jobs and services). For these last two steps, the chosen estimator was Ordinary Least Squares (OLS).

As a conclusion, Table 1 below summarizes variables and their respective sources.

Table 1. Variables retained for the analysis

Name	Description	Source
PSDC99	Population (1999)	INSEE[a]
TOT_EMPL	Number of jobs (1999)	INSEE[a]
ERNET99BV	Sum of net taxable income (€, 1999)	Based on DGI data
POPAGE	Share of population aged 60 or over (%, 1999)	Based on INSEE[a] data
PCTRES	Share of jobs in residentiary services by place of work (%, 1999)	Based on INSEE[a] data
PCTAA	Share of jobs in agriculture and agrifood by place of work (%, 1999)	Based on INSEE[a] data
TT_PU99	Average access time to closest urban core (mn, 1999)	INSEE[a]
SCORE20	Score that reflects a potential related to the presence of jobs and services (over 20, 1999)	INSEE[a]
DHTCH03	Density of hotel rooms (#/km^2, 2003)	Based on INSEE[b] data
DCPGE03	Density of campground spaces (#/km^2, 2003)	Based on INSEE[b] data
DRSCND03	Density of second homes (#/km^2, 2003)	Based on DGCL data
MRTRSM03	Share of tourism export employment (%, 2003)	Based on UNEDIC[c] data
DEPTRSM	Dummy for tourism dependence	Authors' calculations
VARTOPOG	Topographic variation (m, 2000)	Based on INSEE data
PCTARTIF	Share of artificial surfaces (%, 2000)	Based on CLC[d] data
PCTARABL	Share of arable land (%, 2000)	Based on CLC[d] data
PCTAUTAG	Share of other agriculture (permanent crops, pastures, heterogeneous agricultural areas, %, 2000)	Based on CLC[d] data
PCTFORET	Share of forests (%, 2000)	Based on CLC[d] data
PCTHUMO2	Share of wetlands and water bodies (including beaches, sands, dunes, %, 2000)	Based on CLC[d] data

[a] ruralbv1 file (http://www.insee.fr/fr/ffc/docs_ffc/bassins_vie/bassins_vie.htm)
[b] Commune capacity in tourism lodging (http://www.insee.fr/fr/ffc/docs_ffc/tourisme.htm)
[c] Annual statistics by geographic area (http://info.assedic.fr/unistatis/index.php)
[d] Corine Land Cover (http://www.ifen.fr/donIndic/Donnees/corine/presentation.htm)

IV. Results and discussion

1. Cluster analysis

The choice of clusters that are formed by cluster analysis necessarily corresponds to a tradeoff between depicting the diversity of situations and observing patterns across observations. The final number of clusters is 4; it was determined based on values taken by the selection criteria (pseudo F, CCC, R^2) for several runs of proc fastclus (change in the maximum number of clusters allowed). This solution presents an R^2 value of 0.44. Results are detailed in Table 2 (standardized variables).

Iterations confirmed that a combination of wetlands and water bodies yielded a better solution from a statistical perspective. Relatively recurrent outliers were also detected, all located in the *département* of Hérault (especially Marseillan and Palavas-les-Flots, but also Aigues-Mortes, Villeneuve-les-Maguelone, and Le Grau-du-Roi). As these observations were major

tourism destinations and did not appear immediately (at least not before the maximum number of clusters was greater than or equal to the number of clustering variables), it was decided to keep them.

Table 2. Cluster analysis results

Variable		Cluster 1	Cluster 2	Cluster 3	Cluster 4
	N=	606	28	428	683
PSDC99	Mean	0.084196623	-0.10542828	-0.07767036	-0.02171047
	Std. dev.	1.01589184	0.524402537	0.986915895	1.004960382
	Coeff. var.	1,207	-497	-1,271	-4,629
VARTOPOG	Mean	-0.436798185	-0.529195258	1.123356371	-0.294698916
	Std. dev.	0.175401155	0.167261998	1.471042653	0.337607252
	Coeff. var.	-40	-32	131	-115
PCTARTIF	Mean	0.217820603	1.884588949	-0.30947533	-0.076592
	Std. dev.	1.19971072	2.022540055	0.659769934	0.769376214
	Coeff. var.	551	107	-213	-1 005
PCTARABL	Mean	1.101159684	-0.8300129	-0.92304676	-0.36456573
	Std. dev.	0.647837581	0.553553459	0.367308625	0.561036325
	Coeff. var.	59	-67	-40	-154
PCTAUTAG	Mean	-0.76214291	-0.13749297	-0.45912223	0.969564748
	Std. dev.	0.522368482	0.945358802	0.660440291	0.644996224
	Coeff. var.	-69	-688	-144	67
PCTFORET	Mean	-0.40884509	-0.98420714	1.306492243	-0.41560872
	Std. dev.	0.617813162	0.605742457	0.785817362	0.620444346
	Coeff. var.	-151	-62	60	-149
PCTHUMO2	Mean	-0.118565554	6.3893365	-0.104720386	-0.091113281
	Std. dev.	0.364161397	3.397378361	0.392044478	0.427357229
	Coeff. var.	-307	53	-374	-469

Coefficient of variation < 100

Based on coefficient of variation values that are less than 100 (highlighted in Table 2), the clusters formed may be interpreted as follows:

- Cluster 1 comprises 606 rural FEAs. It is mainly characterized by the absence of topographic variation and other agriculture (permanent crops, pastures), but the presence of arable land (field crops).
- Cluster 2 comprises 28 FEAs. Like cluster 1, it is mostly characterized by the absence of topographic variation. Contrary to cluster 1, though, there is a relative absence of field crops and forests, but presence of water resources (wetlands and water bodies). In a less salient way, cluster 2 also comprises FEAs where the proportion of artificial surfaces is relatively high.
- Cluster 3, with 428 observations, features a deficit of arable land that is counterbalanced by the presence of forests, and to a lesser extent by topographic variation.
- Last, cluster 4 comprises the greatest number of observations (683 FEAs). Greater than average presence of pastures and permanent crops, and to a lesser extent marked absence of topographic variation, field crops and forests, are the salient features of this cluster.

In conclusion and generally speaking, there are four clusters of resources: 1) field crop plains, 2) water, 3) forests and topographic variation, and 4) pastures and permanent crops. Population turns out not to be a discriminant variable in the definition of these resource-like FEAs. In contrast, natural resource and landscape feature variables do enable a statistical differentiation of FEAs and corresponding clusters. Water resources seem to be particularly discriminant, as illustrated by the fact that they are the basis of one of the clusters, even if it is the smallest one (28 FEAs).

2. Stylized facts

Tests for differences between means as well as regression analysis on tourism indicators were used to statistically analyze differences between cluster resources and whether they have a differentiated impact on tourism. Results for the means tests regarding clustering criterion and tourism variables are presented in Table 3.

Table 3. Stylized facts by cluster and tests for differences between means

Variables	Cluster 1 (N=606)	Cluster 2 (N=28)	Cluster 3 (N=428)	Cluster 4 (N=683)	Differences[a] between clusters?
Clustering criterion					
PSDC99	12,967	11,150	11,416	11,952	None, except 1-3
VARTOPOG	99.645	52.429	896.914	172.261	All
PCTARTIF	6.194	15.431	3.272	4.563	All
PCTARABL	58.485	9.036	6.654	20.954	All, except 2-3
PCTAUTAG	17.251	30.617	23.735	54.306	All, except 2-3
PCTFORET	16.121	5.264	48.487	15.993	All, except 1-4
PCTHUMO2	0.837	30.398	0.899	0.961	Between 2-1, 2-3 et 2-4
Tourism					
DHTCH03	0.544	9.561	1.354	0.787	All, except 1-4 et 2-3
DCPGE03	2.478	79.713	2.849	2.999	Between 2-1, 2-3 et 2-4
DRSCND03	5.362	164.276	8.954	7.010	All, except 1-4 et 3-4
MRTRSM03	3.449	10.880	9.756	4.001	All, except 2-3

[a] Statistically significant difference between 2 means (p-value ≤ 0.05; sample variances assumed unequal)

Table 3 shows that formed clusters present values that, in general, are statistically different (even with a conservative test). This result is, indeed, expected for clustering criterion variables because cluster analysis aims at creating groups of observations such that inter-cluster differences are maximized while minimizing intra-cluster differences. But means tests on tourism indicators also show statistically significant differences between clusters. Except for campgrounds spaces, which are spatially concentrated in cluster 2 (water resources), hotel room and second-home density and local share of tourism employment are generally different from one cluster to another. That is to say, differences in natural resources do match differences in tourism intensity.

3. Tourism dependence

Using the criterion of twice the rural national average on the four tourism indicators (share of tourism employment, density of hotel rooms, density of campground spaces, density of second homes), several groups of FEAs were identified:
1) Specialization in hotel rooms (DHTCH03 > 2*0.9824683): 143 FEAs with an average of 9 hotel rooms per km^2 (8.76).
2) Specialization in campground spaces (DCPGE03 > 2*4.0120836): 111 FEAs with an average of 48 campground spaces per km^2 (47.83);
3) Specialization in second-homes (DRSCND03 > 2*9.4380075): 118 FEAs with an average of 97 second homes per km^2 (96.64);
4) Specialization in tourism employment (MRTRSM03 > 2*5.3311952): 173 FEAs with an average share of 23% of tourism export employment (23.21).

When employment and lodging criteria are combined, 102 FEAs are identified as tourism dependent or specialized, with the following values on tourism indicators (Table 4):

Table 4. Characteristics of tourism dependent FEAs (N=102)

Variable	Mean	Standard deviation	Minimum	Maximum
MRTRSM03	25.2520188	15.5716053	10.8170861	71.5853659
DHTCH03	8.9662378	16.4027759	0	110.8333333
DCPGE03	38.5544169	99.3384590	0	871.6666667
DRSCND03	88.4558153	204.0024855	1.2830957	1,940.83

Tourism dependent FEAs present, on average, a share of tourism export employment of 25%, with an average of 9 hotel rooms, 39 campground spaces and 88 second-homes per km^2. These FEAs are heterogeneously distributed both from a cluster and a location perspective (see Table A.2 in appendix).

From a cluster perspective, most tourism dependent FEAs are located in cluster 3 (53 FEAs, that is, over half of dependent FEAs), then in cluster 4 (24 FEAs, a little bit less than 25% of dependent FEAs), then in cluster 1 (15 FEAs), last in cluster 2 (10 FEAs). Therefore, it is in cluster 3 (forests, topographic variation) that the highest count of tourism specialized FEAs is found, and it is cluster 2 (water resources) that presents the lowest count of such FEAs.

As the number of observations per cluster varies greatly, these results should also be considered in a relative perspective. Then, it is cluster 2 (water resources) that comes first, since a cluster 2 FEA has a probability over 33% (10/28=0.36) to be specialized in tourism. In contrast, with 15 tourism specialized FEAs out of a total of 606, it is cluster 1 (field crop plains) FEAs that present the lowest probability of being tourism dependent (0.02). By ascending order, one then finds cluster 4 (pastures, permanent crops: 0.03), then cluster 3 (forests, topographic variation: 0.12). In this perspective, it is water resources and topographic variation (correlated with the absence of field crops) that seems to condition, to a significant extent, tourism dependence.

The distribution of tourism dependent FEAs from a *département* perspective shows that it is Pyrénées-Orientales that presents the highest number (9 FEAs), then Haute-Savoie (8), then Savoie (7), then Hérault and Morbihan (6 FEAs each), then Var (5). Those 6 *départements* (out of 96 in metropolitan France, i.e., 6%) thus comprise 40% of tourism dependent FEAs. By descending order, one then finds 5 *départements* with 4 dependent FEAs each (Calvados, Gironde, Isère, Haut-Rhin, Vendée), then 4 *départements* with 3 FEAs each (Charente-Maritime, Finistère, Landes, Puy-de-Dôme). As a conclusion, 72% of tourism specialized FEAs are located in 15 *départements* (that is, 16%).

4. Regression analysis

Regression analysis was used to identify the contribution of various factors to the variation of two groups of variables: tourism indicators and classic indicators of regional growth (population, employment, income).

First, the share of tourism employment, hotel room density, campground space density and second home density were regressed on clustering criterion variables: population, topographic variation, share of FEA's total area in artificial surfaces, arable land, pastures and permanent crops, forests, and wetlands and water bodies.

As PCTARABL was correlated with VARTOPOG, PCTAUTAG and PCTFORET ($.46 < |\rho| < .52$), and its inclusion in the models resulted in a condition index close to 30, it was removed from model specification. Moreover, the presence of field crops is, to some extent, an indicator of the "banality" of the landscape (especially in plains). Therefore, the absence of PCTARABL in model specification may be interpreted as a "background" against which less commonplace resources are highlighted. After dropping PCTARABL, no correlation coefficient value was greater than 0.40, and the condition index dropped to less than 8. The results (corrected for heteroskedasticity) are presented in Table 5.

Table 5. Regression analysis: Tourism indicators

Variable	Share of tourism employment MRTRSM03	Density of hotel rooms DHTCH03	Density of campground spaces DCPGE03	Density of second homes DRSCND03
Intercept	[a]***5.18575 [b](9.20)	***-1.10811 (-3.28)	***-7.10721 (-3.22)	***-10.03229 (-3.68)
PSDC99	***-0.00012312 (-7.89)	*-0.00001968 (-1.81)	*-0.00009421 (-1.80)	***-0.00019103 (-3.13)
VARTOPOG	***0.00887 (11.57)	***0.00136 (6.06)	***0.00249 (3.92)	***0.00988 (7.73)
PCTARTIF	***0.15760 (3.20)	***0.26309 (4.30)	***1.11638 (2.66)	***1.86663 (3.80)
PCTAUTAG	***-0.03561 (-4.93)	0.00339 (0.72)	0.04046 (1.46)	0.03451 (0.63)
PCTFORET	***-0.04585 (-3.73)	0.00429 (0.72)	0.03411 (1.62)	-0.00851 (-0.27)
PCTHUMO2	***0.20385 (5.60)	0.26384 (1.38)	*2.70743 (1.86)	*6.06379 (1.86)
N	1,745	1,745	1,745	1,745
F	***159.96	***68.33	***136.13	***147.46
R^2	0.3558	0.1909	0.3197	0.3373
Adjusted-R^2	0.3535	0.1881	0.3174	0.3351

[a] parameter estimate; [b] (t value corrected for heteroskedasticity)
*** 1% significance; ** 5% significance; * 10% significance
t critical values: 2.576 (1%), 1.960 (5%), 1.645 (10%)

Table 5 shows that all models display strong overall significance (Fisher test). The value of the coefficient of determination is greater than 31%, except for the hotel room model (19%).

In terms of variable significance, the employment model is different from the three others in the sense that every independent variable is strongly statistically significant (t value > 2.576). In other models, the population variable is significant at 10%, even 1%; VARTOPOG and PCTARTIF are significant at 1% in the lodging models; water resources range from non significance (DHTCH03 model) to 10% significance; last, PCTAUTAG and PCTFORET are not significant in the lodging models.

In terms of variable signs, results are consistent across the four models. Thus, PSCD99 is systematically negative, whereas PCTARTIF, VARTOPOG and PCTHUMO2 are positive. PCTAUTAG and PCTFORET are statistically significant in the employment model only, where they are negative.

As a conclusion, these results seem consistent and contradictory at the same time. Indeed, water resources and topographic variation variables come out as positively associated with

tourism indicators, which is consistent with what is known of the attractiveness of these resources. In contrast, population and the proportion of artificial surfaces seem to have opposite impacts (negative and positive, respectively), whereas the two could be intuitively associated. The latter proxies density (in a broad sense, be that population or infrastructure), so this result seems to indicate that tourism activity is associated with low population but high infrastructure density areas, which is consistent, then, with mass tourism features (be that seaside or mountains).

A second series of models tried to analyze the relationship between regional growth indicators and several development factors, including demographic and economic composition, accessibility, service level, and tourism dependence.

The only correlation coefficient value greater than 0.40 corresponds to the POPAGE (share of population aged 60 or more) and PCTAA (share of employment in the farming and agrifood processing sectors) variables: 0.44. Models exhibit a condition index value under 18. Results for this series of models are detailed in Table 6.

Table 6. Regression analysis: Regional indicators

Variable	Population PSDC99	Employment TOT_EMPL	Income ERNET99BV
Intercept	[a]***9,160.57173 [b](8.83)	***3,319.80121 (8.86)	***12,267,586 (10.20)
POPAGE	***-396.61903 (-12.99)	***-140.47955 (-12.74)	***-509,091 (-14.38)
PCTRES	***105.25095 (6.78)	**11.47131 (2.04)	***113,556 (6.30)
PCTAA	***-61.96831 (-3.14)	***-25.57595 (-3.59)	***-99,662 (-4.35)
TT_PU99	***-129.42713 (-12.41)	***-50.61769 (-13.43)	***-126,029 (-10.41)
SCORE20	***1,139.75852 (33.18)	***499.66192 (40.26)	***1,184,694 (29.73)
DEPTRSM	***-6,530.50144 (-8.51)	***-1,510.72900 (-5.45)	***-5,155,377 (-5.79)
N	1,745	1,745	1,745
F	***276.05	***364.35	***237.58
R^2	0.4880	0.5571	0.4506
Adjusted-R^2	0.4862	0.5556	0.4487

[a] parameter estimate; [b] (t value)
*** 1% significance; ** 5% significance; * 10% significance
t critical values: 2.576 (1%), 1.960 (5%), 1.645 (10%)

All regional growth models exhibit strong overall statistical significance (Fisher test, 1% significance level). The value of the coefficient of determination ranges from 0.45 (income model) to 0.56 (employment model).

All variables are strongly statistically significant (1%), except PCTRES in the employment model (5%). Parameter signs are consistent across the three models: negative for POPAGE, PCTAA, TT_PU99, and DEPTRSM; positive for PCTRES and SCORE 20.

These results show a negative association between, on one hand, the proportion of the elderly population, importance of the agrifood sector (both agriculture and food manufacturing) and

tourism dependence, and on the other hand, population, employment and income level. In contrast, the statistical relationship is positive when are considered the weight of the residentiary sector, accessibility (the negative sign of TT_PU99 indicates that the more access time to the urban core is reduced, the more positive the impact on population, employment, and income) and the level of access to job offers and services.

Overall, these results are in line with previous results regarding regional growth factors, such as accessibility. The negative impact of the proportion of the elderly population is also expected: this population has usually reached the age of retirement, hence the negative impact on total employment, with a level of income that is indeed stable but lower than that of the labor force, hence the negative impact on income. The negative association between level of population and proportion of elderly people raises questions regarding the literature on retiree migration to amenity-rich areas. All FEAs cannot be considered amenity-rich, which this result for the rural area average maybe shows.

Negative results for the agrifood sector may also be explained by the fact that, in rural areas, farming certainly predominates food processing; given the reduction in farm population and farming activity, it is not surprising that PCTAA parameters are negative. Also, this result is consistent with the positive sign of PCTRES in the three models: the rural economy has been shifting, for several years, from extractive to service activities. Last, the level of services (and especially when it takes job offers into account) is an attractiveness factor, hence the positive sign for the parameter of SCORE20, as expected.

Thus remains the systematically negative sign of DEPTRSM, the tourism dependence dummy variable. This result is *a priori* surprising because tourism is often touted as a local development strategy. Let us recall that in this analysis, dependence (or specialization) is based on an employment variable and a lodging variable (be that hotel room, campground space or second-home). Consequently, it seems that tourism specialization, i.e., a large share of tourism employment and a high value of lodging capacity, does not lead to higher levels of regional growth indicators. The list of tourism dependent FEAs tends to highlight "classic" locations (seaside and mountains, including resorts). Do observed impacts show negative induced effects related to mass tourism?

V. Conclusions

1. Summary and result implications

Results demonstrate the possibility of identifying resource consistent regions with a cluster analysis that is based chiefly on land cover and altitude. In these regions, which are endowed with different resources, tourism indicators also exhibit different values. Topographic variation, artificial surfaces and, to a lesser extent, water resources seem to be most correlated with tourism indicators.

Using tourism employment and lodging capacity, it is also possible to identify tourism specialized FEAs. We identified 102 such FEAs (out of a total of 1,745 rural FEAs) that are very unequally distributed across the metropolitan territory. Contrary to accessibility and services, tourism dependence does not lead to higher regional growth levels.

These results question the territorialization of tourism public policy as a function of available resources. Moreover, given the negative impact of tourism specialization, and the location of

the corresponding FEAs, it seems appropriate to question the induced effects of mass tourism. In this perspective, tourism policies could more precisely address the two following issues.

First, better promote regions that today tend to be underused, in order to deconcentrate tourism activity and better distribute it across the territory. This strategy could rely on promotion campaigns that would highlight the difference and the specificity of an "alternative" type of tourism, even by promoting adjacent FEAs that today are not as tourism specialized and may satisfy different tourist expectations.

Second, make better use of the concentration of tourism in order to stimulate local economic activity and create more jobs and income. This would include several components: 1) attract population and firms on the basis of existing natural amenities; 2) actively convert some second-homes (or hotels) into main residences, which would rely on rehabilitation efforts of existing housing (e.g., surface increase) that would stimulate the local housing industry and improve the quality of housing supply; 3) offer a range of services so that yearlong residency becomes easier and more pleasant –in a way, deseasonalize the life of the community.

To achieve implementation, these policies must rely on a minimum amount of political will, multimunicipal planning, and land control. Deconcentrated state services and local governments should help local decision-makers in their pursuit of tourism activities with larger positive impacts on the local economy.

2. Study limits and further research topics

A number of limits of the analysis suggest further research topics.

First, given the exploratory nature of this paper, tourism sensitive activities were grouped as a single "tourism employment" set. All these activities are not, however, directly dependent on tourism: such is the case of hotels without a restaurant, but not of beauty salons that depend, to a major extent, on the residentiary economy. Other sectors (e.g., retailing) are impacted by tourism but are not included in tourism sensitive activities. Consequently, a further research topic could be to provide a more refined estimation of tourism employment, by differentiating sectors and taking into account activities that are not considered tourism sensitive but nonetheless impacted by tourists, and by better separating the tourism vs. residentiary share of local employment.

Next, variables that were used for cluster analysis do reflect landscape features, but do not account for all tourism resources in a given area. For example, one could add a landscape diversity index (assuming that the more diversified the landscape, the more attractive the area), climatic condition variables (to account, for instance, for warm summers), or information regarding cultural resources (such as built heritage) or sports facilities. Also, one could add information regarding the quality of the environment or biodiversity (e.g., protected areas). In conclusion, cluster analysis could include a larger set of variables, possibly reduced via principal components analysis.

Two categories were used to define dependence: tourism employment and lodging capacity. Impacts induced by second homes are not necessarily the same, though, as those induced by hotels and campgrounds. Therefore, a supplementary analysis could differentiate the type of lodging and possibly identify differential impacts.

The employment equation has some endogeneity because SCORE20 depends to a significant extent on the employment score, which itself is a function of job offers and the level of labor force that is employed. Further modelling efforts could use a global score that uses all components (competing, non competing, education, and health services) except employment. One could notice, however, that the estimated parameter of SCORE20 displays similar properties (significant and positive) across the three models.

Last, tourism dependent FEAs are geographically concentrated, so it may be interesting to analyze the impact of spatial autocorrelation on estimated parameters.

Reference list

Aubert F., Lépicier D., Schaeffer Y. 2006. Diagnostic des espaces ruraux français: proposition de méthode sur données communales et résultats à l'échelle du territoire national. *Notes et Etudes Economiques*, n°26.

Baccaïni B., Thomas G., Khiati A. 2006. L'emploi salarié dans le tourisme: une nouvelle estimation. *INSEE Première*, n°1099.

Beale C.L., Johnson K.M. 1998. The identification of recreational counties in nonmetropolitan areas of the USA. *Population Research and Policy Review*, 17 (1), 37-53.

Direction du Tourisme. 2006. *Mémento du tourisme 2006*. Ministère délégué au Tourisme, Paris.

Dissart J.-C. 2005. Installations récréatives extérieures et développement économique régional: Le cas des zones rurales isolées aux Etats-Unis. *Revue d'Economie Régionale et Urbaine*, (2), 217-48.

Eadington W.R., Redman M. 1991. Economics and tourism. *Annals of Tourism Research*, 18, 41-56.

English D.B.K., Marcouiller D.W., Cordell H.K. 2000. Tourism dependence in rural America: estimates and effects. *Society & Natural Resources*, 13 (3), 185-202.

INSEE. 2003. *Structuration de l'espace rural: Une approche par les bassins de vie*. Rapport pour la DATAR, avec la participation de IFEN/INRA/SCESS, Paris.

Julien P. 2007. Des bassins de vie, au service de l'aménagement du territoire. *Economie et Statistique*, à paraître.

Leatherman J.C., Marcouiller D.W. 1996. Estimating tourism's share of local income from secondary data sources. *The Review of Regional Studies*, 26 (3), 317-39.

Mcgranahan D.A. 1999. *Natural amenities drive rural population change*. Agricultural economic report n°781, Washington, USDA-ERS.

Mollard A., Rambonilaza M., Vollet D. 2006. Aménités environnementales et rente territoriale sur un marché de services différenciés: le cas du marché des gîtes ruraux labellisés en France. *Revue d'Economie Politique*, 116 (2), 251-76.

Smith S.L.J. 1988. Defining tourism: a supply-side view. *Annals of Tourism Research*, 15, 179-90.

Terrier C., Sylvander M., Khiati A., Moncéré V. 2005. Population présente: méthodes de détermination à partir des enquêtes sur les touristes. Communication aux Journées de Méthodologie Statistique de l'INSEE, 15 mars.

Ullman E.L. 1968. Minimum requirements after a decade: a critique and an appraisal. *Economic Geography*, 44 (4), 364-69.

USDA-ERS. 2005. Measuring rurality: 2004 county typology codes. Online (http://www.ers.usda.gov/Briefing/Rurality/Typology/), accessed february 20, 2007, updated June 26, 2005.

Vollet D. 1998. Estimating the direct and indirect impact of residential and recreational functions on rural areas: an application to five small areas of France. *European Review of Agricultural Economics*, 25 (4), 528-49.

Appendix

Table A1: Descriptive statistics of variables (N=1745)

Variable	Mean	Standard deviation	Minimum	Maximum
VARTOPOG	322.8573066	511.0188181	0	3760.00
PCTARTIF	4.9872632	5.5417860	0	65.0000013
PCTARABL	30.2891693	25.6054683	0	97.8936412
PCTAUTAG	33.5592916	21.3976336	0	90.1396559
PCTFORET	23.8349651	18.8685700	0	88.8631590
PCTHUMO2	1.3750797	4.5424159	0	77.8000033
PSDC99	12,160.22	9582.09	270.0000000	60,700.00
SUPERF	245.8311175	231.2836434	0.4000000	1,887.00
SCORE20	11.3598854	5.0366414	0	20.0000000
TT_PU99	30.0966189	16.3693302	0	126.2000000
TOT_EMPL	3,962.38	3,722.25	285.0000000	25,588.00
ERNET99BV	12,883,618.10	10,732,241.80	228,165.97	67,032,732.02
DHTCH03	0.9824683	4.7644475	0	110.8333333
DCPGE03	4.0120836	26.3239332	0	871.6666667
DRSCND03	9.4380075	54.3341656	0.2750353	1,940.83
MRTRSM03	5.3311952	7.7515162	-1.791045E-8	71.5853659
DEPTRSM	0.0584527	0.2346648	0	1.0000000
POPAGE	25.5575283	6.5469112	5.3603604	48.2052212
PCTRES	52.3837239	12.4571922	16.3204748	96.2500000
PCTAA	16.9064513	10.2227089	0.4569688	63.6666667

Table A2: Tourism dependent FEAs

Code	Label	Cluster	Code	Label	Cluster
01143	Divonne-les-Bains	3	56240	Sarzeau	4
01173	Gex	3	60482	Orry-la-Ville	3
04006	Allos	3	61483	Tessé-la-Madeleine	4
04094	Gréoux-les-Bains	3	62318	Etaples	1
07330	Vallon-Pont-d'Arc	3	62604	Neufchâtel-Hardelot	1
11202	Leucate	2	63047	La Bourboule	4
13022	Cassis	3	63103	Châtelguyon	4
13104	Carry-le-Rouet	1	63236	Mont-Dore	3
14191	Courseulles-sur-Mer	1	64495	Saint-Pée-sur-Nivelle	3
14333	Honfleur	4	65362	Pierrefitte-Nestalas	3
14488	Ouistreham	1	65388	Saint-Lary-Soulan	3
14715	Trouville-sur-Mer	4	66003	Amélie-les-Bains-Palalda	3
17093	Le Château-d'Oléron	2	66008	Argelès-sur-Mer	4
17161	La Flotte	2	66016	Banyuls-sur-Mer	4
17452	La Tremblade	3	66024	Le Boulou	3
22194	Plestin-les-Grèves	4	66037	Canet-en-Roussillon	2
29040	Le Conquet	4	66117	Mont-Louis	1
29058	Fouesnant	4	66124	Font-Romeu-Odeillo-Via	3
29217	Pont-Aven	4	66148	Port-Vendres	4
2A041	Bonifacio	4	66222	Vernet-les-Bains	3
2A065	Cargèse	3	68162	Kaysersberg	3
2B134	L'Ile-Rousse	3	68226	Munster	3
31042	Bagnères-de-Luchon	3	68249	Orbey	3
32096	Cazaubon	4	68269	Ribeauvillé	3
33203	Hourtin	3	73006	Aime	3
33214	Lacanau	3	73054	Bourg-Saint-Maurice	3
33394	Saint-Emilion	4	73181	Moûtiers	3
33514	Soulac-sur-Mer	4	73227	Saint-Bon-Tarentaise	3
34003	Agde	4	73257	Saint-Martin-de-Belleville	3
34126	Lamalou-les-Bains	3	73296	Tignes	3
34150	Marseillan	2	73304	Val-d'Isère	3
34192	Palavas-les-Flots	2	74001	Abondance	3
34299	Sérignan	2	74056	Chamonix-Mont-Blanc	3
34344	Le Grau-du-Roi	2	74080	La Clusaz	3
35049	Cancale	1	74191	Morzine	3
38006	Allevard	3	74238	Saint-Jean-d'Aulps	3
38052	Le Bourg-d'Oisans	3	74258	Samoëns	3
38253	Mont-de-Lans	3	74276	Taninges	3
38548	Villard-de-Lans	3	74280	Thônes	3
39470	Les Rousses	3	80688	Rue	1
40046	Biscarrosse	2	80721	Saint-Valery-sur-Somme	1
40065	Capbreton	3	83019	Le Lavandou	3
40310	Soustons	3	83036	Cavalaire-sur-Mer	1
44211	La Turballe	1	83107	Roquebrune-sur-Argens	3
50031	Barneville-Carteret	4	83115	Sainte-Maxime	3
50410	Pontorson	1	83119	Saint-Tropez	3
56034	Carnac	4	85113	L'Ile-d'Yeu	1
56054	Etel	1	85234	Saint-Jean-de-Monts	4
56069	Groix	1	85288	Talmont-Saint-Hilaire	4
56152	Le Palais	4	85294	La Tranche-sur-Mer	4
56186	Quiberon	2	88196	Gérardmer	3