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URBAN SPRAWL IN FRANCE. A REGIONAL TYPOLOGY OF URBANIZATION TRENDS AND ITS DEMOGRAPHIC AND ECONOMIC BACKGROUND

ABSTRACT. Coming from a rural background, the urbanization of the French society was late, and urban population became larger than rural population only in 1930. Urbanization progressed steadily during the decades of high economic and demographic growth following World War II. The last third of the Twentieth Century in France was dominated by an overall tendency to urban sprawl. Population growth and scattered urbanization was the result of several distinct causes. Urban sprawl comes in the first place. It follows that growth has been polarized in a few regions. Multivariate data analysis tells us that the population growth has the most important lever effect on urbanization, particularly migratory attractivity. Ageing is another major cause, because 4/5th of the decrease of size of households is due to ageing. Tourism is another important factor, particularly in the coastal areas and in mountainous regions.

KEY WORDS: settlement geography, demographic trends, urbanization, urban sprawl, France, regional typology.

INTRODUCTION

Everyone agrees that land consumption by urban development has become a major concern throughout the world. So we should examine the situation in France, not only by a collection of case studies, but by a general overview based on quantification of long-term changes in the settlement geography.

First, let's keep the simplest definition of "Urban Sprawl". This concept designates the colonization of the countryside by the city, particularly associated

with improvements in mass transport. In this meaning, urban sprawl is one of the possible scenarios of *urbanization*. The first point to note is that urbanization is both a structural and a functional general process which affects land use. Structural properties refer to those characteristics of any physical environment that are comparatively stable over time and in most cases have emerged as a result of human endeavour spanning over many years. Such structural properties are established land-use patterns, settlement structure and the distribution of population. Functional properties refer to the factual use of the physical environment such as various forms of production, consumption and communication. We assume that "urban" and conversely "rural" characteristics of particular territories can be defined according to various structural and functional properties, even if the line between them became blurred. Everyone agrees with the fact that urbanization resulted from a functional shift of the economic base from agriculture to services. But the stages of the process are specific to each country. In the case of France, it was a three stages process. The first stage went slowly from the French Revolution to WWII. The second stage was rapid between 1945 and the early 1970's. Then the third stage has begun: the stage of the urban sprawl.

This paper focuses on the structural changes resulting from this urbanization process based on the French census data from 1968 to 1999. Our main concerns are the following:

— What is the extent of the phenomenon, both spatial and quantitative?
— Are all parts of the French territory equally affected?
— Does Sprawl affect only the surroundings of the major urban centres? Otherwise, what other sort of territories are affected?
— What are the demographic strengths at work which contribute most to urbanization?
— What is its economic background?

Firstly, let us examine the general context of this period.

THE TURNING POINT OF 1968

The choice of the starting point is important, because the trends depend of the time boundaries we set around the period of observation. The study of French population is constrained by the dates of censuses. Since the creation on the National Institute of Statistics and Economic Studies (INSEE) general censuses occurred at irregularly spaced dates: 1954, 1962, 1968, 1975, 1982, 1990 and 1999. The date of 1968 fits well our needs, for it is situated at an important turning point in the urbanization history of this country.

Coming from a rural background, the urbanization of the French society was late, and occurred when the country entered into the mass consumption

society. For example, it was only in 1968 that the majority of the French households acceded to car ownership (1929 in the USA). According to the French census, urban population became larger than rural population only in 1931. Urbanization progressed steadily during the decades of high economic and demographic growth following World War II.

Table 1. Metropolitan France: historical urbanization 1936–1968

DATES OF CENSUS	LEGAL POPULATION (THOUSANDS)	URBAN POPULATION (THOUSANDS)	RURAL POPULATION (THOUSANDS)
1936	41,813	25,318	16,495
1968	49,712	36,546	13,166
Absolute change	+ 7,899	+ 11,228	- 3,329
Relative change (index base 100=1936)	119	144	80

Source: INSEE Census

The Baby Boom following the War lasted from 1945 to 1973, with a total fertility rate higher than 2.1 children per woman. As a result, after having undergone some moderate losses during WWII, French population increased by more than 8 millions between 1946 and 1968. The entire growth benefited to cities, as millions of peoples moved from rural communities to urban dwellings. French people felt deeply the rural depopulation during this period, and the rural – urban migration was somewhat emphatically named "Rural Exodus". 1968 was the year of a census. This year was characterized by huge social protests. The radical critic of the new urban housing conditions was but one among the many subjects of protest, but the critics concentrated on housing projects, which have been built in the recent decades. The ruins caused by the War resulted in a severe housing shortage. Urbanism was placed under the collectivist influence of the "Charter of Athens", so the bulk of the housing demand was answered by large housing projects building programs which permitted at last to calm down the crisis after 1962, by the reduction of small, overcrowded and comfortless housings. In consequence, less than 45% of the population lived in individual housings and less than 44% of the households owned their home in 1968. This kind of urbanization did not cease suddenly after the demonstrations of 1968, but the period 1968-1975 constitutes a transition where the earlier stage of mass urbanization came to an end and the latest stage of urban sprawl began.

The last third of the Twentieth Century in France was dominated by an overall tendency to urban sprawl. At the time of the 1968 census, the newly issued "Pisani" law on urbanism (1967) introduced the zoning principle in France.

The strict separation between housing neighbourhoods and activity zones encouraged the exurbanization of activity zones along the main highways, giving birth to "edge cities" of industrial zones and shopping centres accessible only by car. In 1969, the "Chalandon" Individual Housing Contest inaugurated the new public policies favouring accession to property for the middle-class households. These policies, made of state guaranteed access to real estate credit for the households, have largely succeeded since this date and their effects on urban development are now obvious.

Table 2. Metropolitan France: total population growth 1968–1999

Dates of census	Statistical population (thousands)	Total households (thousands)	Number of persons per household
1968	49,701	15,828	3.1
1999	58,506	23,810	2.4
Absolute change	+ 8,805	+ 7,982	-0.7
Relative change (index base 100=1968)	118	150	77

Source: INSEE Census

France's population increase held approximately the same mean rhythm between 1968 and 1999 as between 1936 and 1968, around +0.9% per year (+1% per year in the former 32 years period), inducing a total growth of +8.8 millions persons (+18%) in the whole span of this 31 years period.

During the same period, the number of households increased by a total of + 8 millions (+50%), as the mean number of persons by housing dropped from 3.1 in 1968 to 2.4 in 1999. The demographic trend toward ageing has resulted in the impressive growth of the number of households. The pressure of demand on the housing market has increased since 1968, and was answered principally by the construction of detached houses. Single family houses rose from 45% of the total in 1968 to 55% of the total in 1999, because nearly 6 millions new single family houses have been built during this period. Now, a majority of the French households own their home (55% in 1999 against 44% en 1968). Globally, the French housing policy succeeded to satisfy the demand, both quantitative and qualitative. The mean habitable surface of the housings rose from 68 square metres to 90 square metres and the comfort of housing was greatly improved. The mean number of rooms increased from 3.3 per housing in 1968 to 3.9 per housing in 1999, and the mean number of persons per room dropped from 0.9 in 1968 to 0.6 in 1999. By the standard of 1968, 37% of the housings were "overcrowded" and 19% of the households stated that they were ill-lodged. At the date of 1999, these proportions dropped respectively to 10% and 6%.

These last decades are also characterized by decentralisation of the decision-making procedure influencing land use and development. All these tendencies are obviously proceeding hand in hand. By the disqualification of the previously existing hierarchical planning systems, the planning and building codes have been amended toward increased liberalism. The pressure of demand for housings was combined with the general mistrust in housing projects, where poor immigrant families are now over-concentrated and which has become some sort of "ghetto", and the general preference for an owner-occupied detached house with a garden to produce a huge impetus for urban sprawl. Another important functional change made urban sprawl possible during the period. The generalisation of car-mobility resulted in time-space convergence and a global change in the scale of the cities. The number of automobiles rose from a 10 million figure in 1967 (0.8 cars per household) to 27 millions and a half in 1999 (1.3 cars per household).

THE PATTERNS OF URBANIZATION TRENDS

It is now worth turning one's attention to the spatial patterns of urbanization through a multivariate exploratory data analysis. The first problem is to choose the right scale, meaningful indicators and a robust methodology.

THE DATABASE

The 36,550 communities of France are the base and the core of the French territorial administration since their creation in 1789. This territorial division has remained almost unchanged since this date. The average size of a community is of 15 square kilometres. 35,700 communities (98%) have less than 10,000 inhabitants, 32,000 (88%) less than 2,000 inhabitants, 28,000 (77%) less than 1,000 inhabitants, 21,300 (58%) less than 500 inhabitants and even 4,000 (11%) communities have less than 100 inhabitants! This is a very fine level of observation of the French Geography. Despite their great number, Communities are the right level of observation for the study of urban sprawl. The Community is the first and the most venerable institution of the French democracy; its political legitimacy is undisputed. It is ruled by a Council elected for a 6 years term. The Council elects the Mayor, who is the first and the most commonly known, and the most popular keeper of the authority of the State. Most Mayors are easily re-elected for as many terms as they want, especially in the tiny communities of the countryside. The Community Council votes the Local Plan for Urbanism (PLU), the only regulation opposable to a developer. The town hall keeps the land registry and the Mayor grants the permit to construct any building on the Community's territory. The spatial stability of this territorial division is another trump card for long-term analysis.

Luckily, the statistical definitions of the French Census have remained unchanged in all the censuses which occurred from 1968 to 1999. The Census is a vast inquiry, exhaustive from its grounding in 1806, until the latest census in 1999. Interviewers are hired by the Community and investigate all the housings. So the rural population is precisely known at the date of the Census. But problems arose in large cities like Paris, where some people avoided the inquiry, and the total population had been under-estimated in 1999 by an approximate number of 400,000 persons, an error of less than 0.7%. We benefit of a stable statistical source and of a stable territorial division on the entire period ranging from 1968 to 1999. So we can be confident in the results of the data analysis.

STATISTICAL METHODOLOGY

Multivariate data analysis is an exploratory step in the statistical reasoning. Firstly, it is aimed at checking the redundancy between the variables and to retain the best one for a further step of modelling. Secondly, the data analysis produces a regional typology, which will perhaps help us better to understand the main characteristics of the French settlement geography. The first step is to define some meaningful indicators. We can see that the total population (1999) of communities vary from 1 (*sic!*) to 2,125,246 inhabitants (Paris), it follows that we have first to replace the raw numbers by calculated variables in order to deal with the main size-effect. So, we retain 11 active variables and 3 illustrative ones:

Table 3. Variables introduced in the data analysis

Indicator Active or *Illustrative*	Mean value between 1968 and 1999
1	2
Mean annual rate of population growth (per 1,000 inhabitants in 1968)	+5.3‰
Mean annual rate of natural population growth (per 1,000 inhabitants in 1968) Resulting from local births and deaths	+4.4‰
Mean annual rate of migratory balance (per 1,000 inhabitants in 1968) Indicator of attractivity	+0.9‰
Mean annual rate of housing growth (per 1,000 housing units in 1968) Indicator of urbanization	+14.7‰
Share of vacant lodgings in 1999 (per 100 housing units)	6.9%
Variation of the share of vacant lodging from 1968 to 1999 (per 100 housing units) Inverse indicator of attractivity	+0.3%
Share of vacant lodgings in 1968 (per 100 housing units)	*6.6%*
Share of second homes in 1999 (per 100 housing units)	10.1%
Variation of the share of vacant lodging from 1968 to 1999 (per 100 housing units) Indicator of vacation development	+3.4%

Share of second homes in 1968 (per 100 housing units)	*6.8%*
Mean annual rate of second homes growth (per 1,000 second homes in 1968) Alternative indicator of vacation development	+28.1‰
Number of persons per household in 1999	2.4
Variation in the number of persons per household between 1968 and 1999 Inverse indicator of ageing	-0.7
Number of persons per household in 1968	*3.1*

We make a two step data analysis. First, a *Principal Components Factor Analysis* (PCA) is used to check the redundancy between indicators and to analyse their correlation. Then, a *Hierarchical Cluster Analysis* is conducted on the 10 first Eigenvectors of the database in order to aggregate the communities into classes.

COMBINATIONS OF INDICATORS

The linear combinations of the indicators tell us that urbanization is strongly dependant of the demographic growth. However, the migratory balance has more impact on communities than the natural growth. Demographic growth is inversely proportional to vacancy of lodgings, which is an inverse indicator of attractivity. One can note an interesting association between the share of second homes and the migratory balance. Holiday resorts are attractive, but this tends to reduce the share of second homes in the total number of housing units. The size of families is larger in communities where demographic growth is positive, conversely it is an inverse indicator of ageing of the total population, which results in negative natural growth (more coffins than cradles).

Among the other facts of secondary importance, one can note that some holiday resorts tend to specialize and the share of secondary residence is more unevenly distributed through the French territory in 1999 than it was in 1968. Part of the countryside, which suffered from heavy depopulation before 1968 during the so-called "Rural Exodus", has become a holiday resort with a high share of second homes. Consequently, second homes tend to be associated with small family sizes and with high share of vacant lodgings.

Furthermore, we can notice that the variation of the share of second homes in the total number of housing units is better correlated to urbanization that the mean rate of growth of second homes. On the long run, French communities have very disparate rhythms of demographic growth and urbanization. The second main division opposes communities where natural growth is important, but migratory balance is often negative to attractive holiday resorts.

RESULTING TYPOLOGY

The hierarchical classification of the French communities based on the results of the PCA indicates that a 5 class typology is optimal.

The first class is constituted of the communities where population growth due mostly to immigration is the most important, causing a consecutive rapid urbanization.

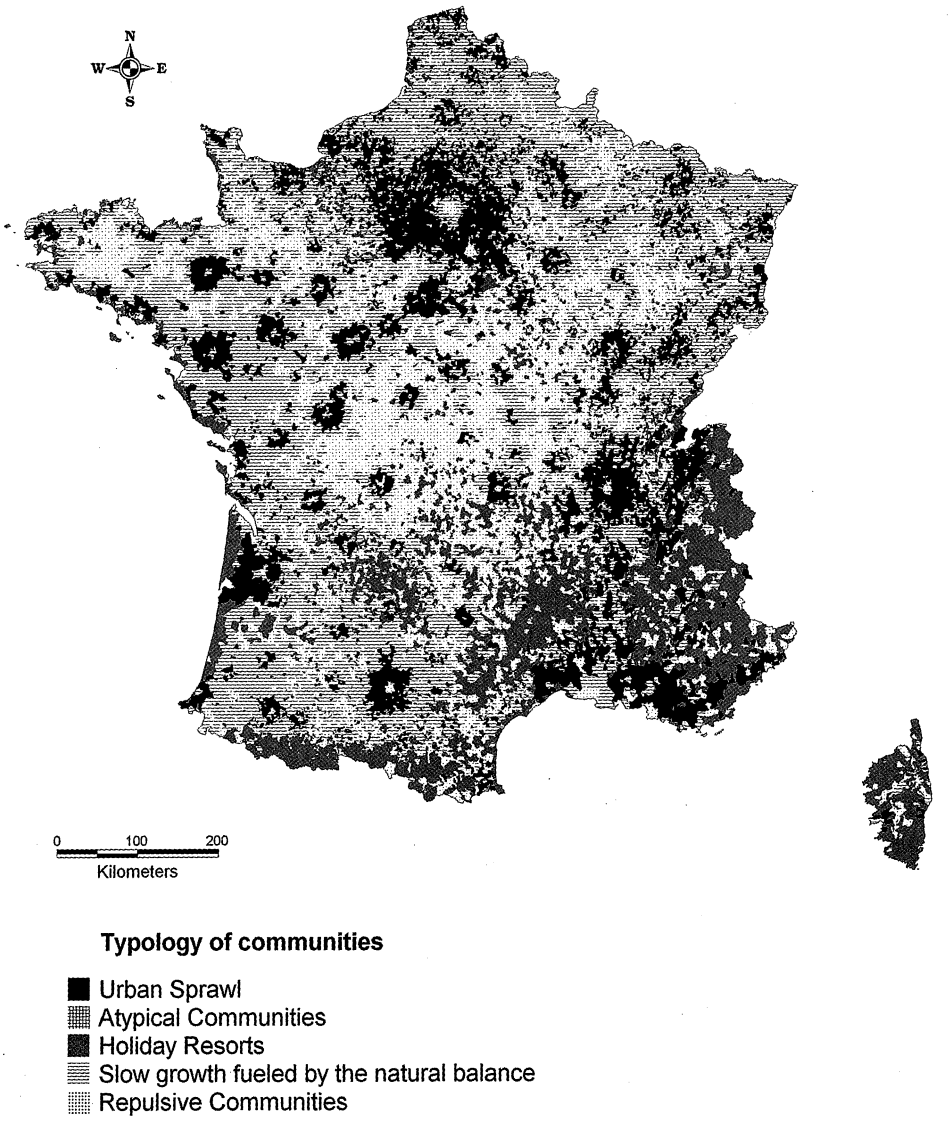

Fig. 1. Typology of the long-term trends of the settlement geography of France from 1968 to 1999
Source: According to INSEE Censuses
Method: Principal Components Ananlysis of 11 indicator variables of long-term trends representing urbanization and demographic growth in the 36,550 French communities

Class 2 contains a few atypical communities with a combination of strong immigration and natural growth, together with large families and some sort of housing shortage.

Class 3 is constituted of these communities which can be named "holiday resorts", with often a negative natural balance of population, and a large share of second homes.

Class 4 gather the bulk of French communities, around the national mean profile, where natural growth is more important than migrations in the total population growth.

Class 5 gather these communities which can be named "repulsive", where the population decline is driven by out-migration.

The map of figure 1 shows us the main trends of the settlement geography in France. The geographical distribution of the classes draws up some cohesive regions.

High growth and urbanization occurred in large halos around the urban poles. In short, the multivariate data analysis of long-term trends in settlement geography permits to draw the map of Urban Sprawl in France. The halo of sprawl can be observed around any city, larger around the great ones, smaller around the medium sized and small cities, but no one has no halo of sprawl.

In short, according to Myrdal's theory of cumulative inequalities of development (1957), the French territory displays a strong *backwash effect*. Nearly 9,000 communities located either in the outskirts of the major urban poles, or on the Mediterranean coast and in the Northern Alps have polarized the bulk of growth and undergone the most rapid urbanization process.

Occupying 20% of the territory, the 9,000 communities which belongs to the "Urban Sprawl" class rose from 15% to 23% of the total number of housing units between 1968 and 1999. 36% (3,716 thousands units) of the new French housings were built in these communities. At the same time, their population rose from 15% to 28% of the total of Metropolitan France. This represents 97% of the total population growth of France during this period (8.5 millions people in Class 1 for a total growth of 8.8 millions people).

Table 4. Raw characteristics of the "urban sprawl" class

Numbers	Communities of the "Urban Sprawl" class	Other Communities	Total Metropolitan France	Share of the "Urban Sprawl" class (percentage)
Number of communities	9,090	27,460	36,550	25%
Surface (square kilometres)	108,950	434,830	543,780	20%
Population 1968 (thousands)	7,618.9	42,081.9	49,700.7	15%
Population 1999 (thousands)	16,125.7	42,380.3	58,506.0	28%
Housing units 1968 (thousands)	2,771.3	15,486.4	18,257.8	15%
Housing units 1999 (thousands)	6,487.9	22,199.4	28,687.2	23%

Two thirds of the demographic growth was due to the migratory balance for the communities belonging to the "Urban Sprawl" class (migratory balance of +16.3‰ pro year and natural balance of +8.2‰ pro year). The figure is a negative migratory balance of -3.4‰ pro year hardly compensated by a positive natural balance of +3.6‰ pro year for the remaining communities. The mean rhythm of urbanization is of +27.8‰ pro year in the "Urban Sprawl" class against a mean rhythm of +11.7‰ pro year in the remaining communities. The difference between the indicators of population growth and of urbanization can be explained by two facts. First, the mean size of families is larger in the "Urban Sprawl" communities (2.7 persons per household in 1999) than in the remainder of France (2.3 persons per households in 1999). This figure decreases less in the "Urban Sprawl" communities (-0.6 persons per household between 1968 and 1999) than in the other communities (-0.7). This indicates a younger population and a slower ageing process associated with attractivity and a better natural balance. The reduction of the share of vacant lodgings is another consequence of attractivity. The mean share is of 4.5% in 1999 for the "Urban Sprawl" class against 7.5% in the other classes. This share has decreased of -2.5% between 1968 and 1999 in the communities belonging to the "Urban Sprawl" class against an increase of +1.1% in the other communities. Moreover, the share of second homes decreases in the "Urban Sprawl" areas, and conversely rises in the other communities. The mean share is of 5.4% in 1999 for the "Urban Sprawl" class against 11.5% in the other classes. This share has decreased of -5.5% between 1968 and 1999 in the communities belonging to the "Urban Sprawl" class against an increase of +5.5% in the other communities.

OTHER CLASSES OF THE TYPOLOGY

The second class of the typology represents a few dispersed cases and we can overlook it.

On the contrary, the third class displays an interesting geography. These communities are concentrated on the shores of the Atlantic Ocean and the Mediterranean Sea and in the mountain ranges of the Pyreneans, the Alps, Corsica and the Central Plateau. The southern part of France concentrates most of these attractive but somewhat aged communities. These territories experienced urbanization without population growth, because construction was fueled by second home development.

The fourth class represents the average communities, which are not particularly attractive, but where the population increases nonetheless, with a significant natural growth. They are concentrated in the Western and the North-Eastern part of France.

The fifth and last class represents the repulsive communities, experiencing population decline. This class groups together communities which are in fact in

two very different situations. There are rural communities which experienced prolonged out-migration. These can be seen particularly in Central France, and in some parts of the north-western and north-eastern regions. But this class includes urban centres too. The decline of centres is clearly visible in Paris and in the neighbouring communities and in the other largest cities: Lyon, Lille, Marseilles, Toulouse, Nice, Strasbourg and Bordeaux for example.

CONCLUSION

The multivariate analysis shows how urbanization was the result of two distinct causes in France between 1968 and 1999. Urban sprawl comes in the first place, and tourism in the second place. It follows that growth has been polarized in a few places. Urban sprawl covers only 20% of the French territory, but these places have captured 97% of the total population growth, resulting in an absolute increase in density of 25 new housing units per square kilometres in the communities which belongs to the "Urban Sprawl" class against a growth of only 15 units in the other communities. The density doubled, rising from 25 housing units per square kilometres in 1968 (national mean of 34) to 50 housing units per square kilometre in 1999 (national mean of 53). It is true that urbanization is slower than demographic growth in the "Urban sprawl" area. Inmigrations resulted in the slow down of ageing, a higher birth-rate and a lower death rate and larger families, and then second homes and vacant lodgings acted as adjustment variables, being partially converted into main homes.

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