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# **The dynamics of social specialisations in a system of cities**

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## **Abstract**

Differences in the social composition of population between cities are not as important as residential social segregation phenomena inside cities. However, an interurban social segregation does exist, even if it is not so often perceived and described. The social specialisation of cities is linked with two structuring features of the urban systems, the hierarchy of size and functions and the economic specialisation. After a longitudinal study of French cities over thirty years, we can relate the interurban social segregation process to the uneven diffusion of the innovation cycles within the urban system. It gives rise to differences in social profiles of cities which, once created, are maintained by further evolution. The unequal quality of the urban images generated by their social profiles are reflected in the global attractivities of cities. Therefore, they contribute to shape the further channels of innovation diffusion in the urban system.

## **1 Introduction: the concept of social image**

Whereas intra-urban social segregation has been studied quite deeply and formalised in various theories and models (Knox, 1989, Ley, 1983), social differences between cities did not receive the same attention (Bourne, 1991). Although the differences in the social composition of population from one city to another are generally not so important than between the neighbourhoods inside a single urban area, they do exist and persist long enough to deserve a study of their role and evolution within the structure of the systems of cities.

Empirically, cities have been for long characterised by their majoritarian social groups as proletarian cities, "middle class" or "bourgeoises" ones (Chatelain, 1946). Most comparative studies have showned an increasing skill level of the labour force with city size, which is now recognized as a decisive aspect of the metropolisation process in urban systems (for instance, Saint-Julien, Pumain, 1986). More recently one has recognised the emergence of local concentrations of populations of technicians and ingeneers, born with the development of the technopoles (Chenu, Tabard, 1993). The typology means something more than objective differences in social profiles, because it is reinforced by collective representations. The social differentiation of cities is then not very often perceived as such, but through cultural manifestations or because of the links with other urban characteristics, the most obvious of which is the mean standard of living.

Existing theories of such differences mainly relate them to the economic basis of cities (Aydalot, 1985, Scott, 1988, Suarez-Villa, 1988). There is usually a strong dependence of urban social profiles upon the specialisation of the cities in certain economic activities. However, some recent investigations suggest that the local social structures may be more responsible today for the differentials in attractivities among a set of cities for their economic development. The specific synergies which are developed in the so-called "innovative milieux" (Camagni, 1992) may be responsible for the booming of the most successful technopoles. The specific intervention of the social links in this process is not yet fully understood. It may be altogether a matter of education, skill, connections between venture capital and local powers. There is also probably a learning process in the development of complex urban economic and cultural institutions, both official and officious, which is the only possible explanation for the observed differentials in the efficiency between cities having a long history of monocentric development and conurbations of the same total size (Cattan et al. 1994).

Several authors also have demonstrated the role of social city profiles in the identity of cities, in the perception of their image, especially when those symbolisms are amplified by urban marketing (Borchert, 1994, Dematteis, 1994). The urban societies can not only be conceived as passive secondary structures which would be explained by the location patterns of economic activities, they also are to be integrated in the problematic of uneven urban development, possibly under the mediation of social images.

Our investigation in this paper concentrates on the comparative transformations of urban social profiles in the French system of cities during the last thirty years. We will not deal with the meaning of the contemporary social transformations, nor with the role of social links into urban development, for which we only have indirect insights. The simple description of an urban society through the social composition of its population is not sufficiently accurate for completing serious inquiries about such questions. But we will try to explain how the social differences between cities are maintained over time, and try to understand the conditions of their emergence.

Despite the not too well adapted set of data that we are forced to use, we shall try not to limit ourselves to comparative statics, but to explain our observations within a dynamic theory of the evolution of systems of cities (Pumain, 1992). Whereas the changes in urban social profiles are obviously linked with the cycles of innovation diffusion within the urban system (Suarez-Villa, 1993), we will show that the perception of their effects also play an active role, as revealed by the urban attractivities on migrations. This paper is only a preliminary study of the process of change in social image before developing a dynamic model. In a further step we

would like to model it as a not entirely deterministic process of transitions of competing individual cities between various accessible states in the socio-economic space.

## **2 The diversity of social profiles**

We are able to compare the social composition of 78 urban agglomerations larger than 50 000 inhabitants, at four points in time, in 1968, 75, 82 and 90, and for various levels of disaggregation, from census data. There was a major change in the nomenclature of "socio-professional categories" in 1982, so in this presentation we shall concentrate on a four categories nomenclature which allow for comparisons, although we have tested more detailed descriptions at each date. For that set of urban agglomerations, other indicators are available about the economic composition of their labour force as well as various indexes evaluating the "economic health" or standard of living in cities, like the amount of value added taxes per inhabitant, mean income levels, salaries, prices for housings and offices and unemployment rates. Those last informations could be collected at three dates only, around 1970, 80 and 90.

### **2.1 Social diversity and inequalities in standards of living**

The evolution of the mean urban social profile since the end of the sixties is an expression of very general shifts in the production processes and division of labour. Two social groups are losing their relative importance: the self-employed, from 9% to about 6% of the labour force, and the blue collar workers, from 43 to 32%. In both cases, the retraction of the groups is accompanied by a reduction of their weight in the more specialised cities, whereas their relative dispersion in the whole set of cities does not change much. The two other social groups are growing, the managers from 22 to 29 % and the employees from 25 to 31% of the active population. In that case, both minimal and maximal values are increasing, and this corresponds to a general diffusion of those categories in the whole urban system. However, the relative inequalities in the representation of the managers (as measured by the variation coefficients) remain much more important than the differences in the shares of employees, which are converging towards an homogenisation of the presence of this category in the large towns.

The urban society is only roughly described by such aggregated social groups. Nevertheless, the inequalities that they reveal in the social composition of cities are not so weak, with coefficients of variation between 0.1 and 0.3, when compared to the dispersion of the indicators of the standards of living which are linked with the social status of the population. Whatever the social group to which they refer, the mean salaries are the most homogeneously distributed variable: their variation coefficient is less than 0.1, even less than 0.05 in 1990 in

the case of employees. The indicators related to household incomes are a little more unevenly distributed, as well as the housing prices (coefficients between 0.1 and 0.15). Only the prices of the business offices keep a higher level of inequalities from one city to another (coefficient of 0.2), which is comparable with the ones of the distributions of social groups. Contrary to observations made in the United States (Massey and Eggers, 1993), there was no increase of the interurban disparities of those standard of living indices during that period.

The low level of dispersion of the prices from one city to another is probably the result of the high speed of the adjustment process of those variables. They are also positively correlated, in a rather systematic manner, with the net migration rates. Similar results were obtained when comparing the evolution of interregional differences in housing prices through England (Alexander and Barrow, 1994, Thomas, 1993). This does not mean that high prices are an attractive factor for migrants but more probably that they reveal a strong demand for some locations and result from a pressure on the housing market due to a positive net immigration. The interurban differentials in attractivity, as measured by variation coefficients of the net migration rates as high as 1.5 and 2 according to the periods, are of a far wider amplitude than the social and economic disparities.

## **a2.2 Social composition and economic performance**

The spatial distribution of the specialisation of urban social profiles is still mostly linked to the uneven spatial diffusion of the first industrial revolution. A few industrial cities of northern and central France have rather specialised profiles, with more blue collar workers, while some southern cities like Béziers exhibit a strong underrepresentation of those categories but have many self-employed workers.

The correlations between the proportion of each social group and the other variables are not very surprising. As expected, industrialised cities with many blue collar workers are poor, whereas tertiary ones having more managers and white collars employees are wealthier. Some details are interesting however (table 1). The indicator of urban wealth, which is measured after the amount of collected value-added tax, is not only low in cities of industrial workers and high in tertiary cities supplying central place functions, it is also high in cities having large shares of self-employed in their labour force, i.e. cities where trade and tourism are well developed activities. On the contrary, the net income as measured after income-tax sources is not higher in this last type of cities, the correlation is insignificant. The distribution of the salaries is also peculiar: the mean level of wages for the employees is not correlated with any feature of the social profile of cities. The mean salary of the workers used to be distributed in an opposite way to the wealth and the net income in the middle of the sixties: it was higher in

industrial cities (with a high skill level of blue collar workers and a tradition of strong trade-unions) and lower in cities of self-employed and employees. The correlations are no longer significant. The general level of salaries is becoming positively correlated in the eighties with the share of managers in urban employment only.

It is also worthwhile to note that only the proportion of the self-employed has a positive correlation with the level of business offices prices, which on the contrary are much lower in blue collar worker cities. Housing prices are beginning to follow the same pattern only from the end of the eighties on.

Those various links may be summarized in a simple manner with a principal component analysis made on all social and economic indicators for the 78 cities. (The stability of the results was tested on more disaggregated nomenclatures, or by removing the too redundant variables and a city with an extreme position on the two main axes like Paris - the results are globally the same in any cases). The general configuration of the interurban social structure is very similar to those which were observed on broader sets of cities in France, or even at lower geographical scale, inside urban areas (Pumain, Saint-Julien, 1995). The main difference is between "proletarian" cities, with many blue collar workers, and the ones which concentrate more tertiary professions. Those again divide between commercial cities, with many self-employed, (craftsmen and traders mainly), and service cities, with office employees and managers. The first two axes of a principal component analysis are strongly related to this structure (table 2).

Clearly, this very apparent, simple model of the social structure is a cross-sectional image resulting of an historical process of specialisation and differentiation of urban societies, which is linked itself to the spatial division of labour as induced by the location of economic activities. The main difference today between social profiles is an inheritance of the industrial revolution of the last century, whereas the second factor illustrates a further differentiation from pre-industrial urban profiles, with predominant non-salaried work, towards societies dominated by the more recent models of the organisation of labour in services, administration and production.

The grouping of the economic sectors and of the other urban indicators around the social categories helps to risk a more global and evolutive interpretation of the factors (table 2). The first factor has growingly narrow links with the recent attractivity of cities (as measured by the net migration rates), the ordering of the cities that it generates corresponds to the perception of the quality of their image of today (see also the increasing positive correlation of this factor with the indices of the standard of living, especially mean household income and real estate

prices). The second factor is positively correlated with the levels of all kind of salaries, it also ranks the economic sectors according to their main development period, from the oldest (now decreasing their share in employment) to the newest (still increasing). That factor can then be interpreted as the interurban differentiation created by the uneven spatial diffusion of the last cycle of technical innovations.

### **3 Changes in social specialisation**

This interpretation of the 1990 data not surprisingly is of the same kind than the explanation found in former studies of this very slowly evolving structure of the urban system (Pumain, Saint-Julien, 1978). The analysis of the evolution of this structure raises however difficult methodological problems.

#### **3.1 Methodological problems**

The representation of urban change and of the trajectories of each city in a space of phases reflecting the dynamics of their socio-economic profiles is very difficult. Several authors suggested to describe the structure of urban systems after a small number of latent dimensions (Berry, Kasarda, 1972, Parr, Reiner, 1980). It can be agreed that the concept of a structural dimension of an urban system is necessarily a multivariate description. Because of the complexity of the cities, the changes are always multiple and simultaneous, they never affect only a single feature of the urban structure at a time. Perhaps we still lack of the complex indicator which would summarize the multiple facets where urban changes are occurring. The few differentiation principles which are represented in a synthetic way by the main factors of a principal component analysis can be taken as a proxy for the structural dimensions of the urban system, and most often for the traces of past differentiation processes.

Such a representation has nevertheless several drawbacks. The first is that its interpretation can hardly be dynamic, or, better, adaptive: the content of a factor, whatever we decide to call it, "urban attractivity" or "modernisation of economic structure", should continuously be changing over time. The variables which are summarized in a factor slowly change their correlation with the factor (they even change their actual technical and cultural content, even if they keep the same denomination). It may be said that in any case, from the point of view of the urban system, the factors keep the same structural significance: we always can distinguish at a given moment between the cities which are attractive and those which are not, and between the ones which have adopted the innovations of the previous period quicker than others which remain

backwards. The real interpretation of the factors lay actually in the relative dynamics of cities, and not in momentarily fixed structural variables.

The use of a factor analytic description leads however to a reductionist view of urban structure and dynamics. Principal component analysis operates as a filter on the total information brought by the socio-economic differences between cities. It can only be seen as a first attempt to capture the nature and direction of urban dynamics, before testing more complex models of urban change.

### **3.2 Structural stability**

As mentioned in an earlier work (Pumain, Saint-Julien, 1984), multivariate analysis of the social composition of cities made at different dates illustrate the high degree of stability of the pattern of socio-economic differentiation in the system of cities (table 2 and figure 1). The same global structure is maintained. The main social change appears with the diffusion of the employees, which are no longer representative of any innovative model. The position of the blue collar workers on the second factor is slightly evolving closer towards the more obsolete types of social structure. The main change affects the position of the net migration rates: during the first period the most attractive cities were characterised by a rather average socio-economic structure, and progressively there is a shift of the attractivity towards cities with more innovative structures, which is also closer of the actual level of their image.

There were also some slight changes in the significance of the factors, as attested by the correlation coefficient between the factors of the four PCA . The first factor remains the more stable in terms of ranking of cities (correlation of 0.9 between the first and last period, with a progressive deformation) whereas the second has changed more significantly (correlation of 0.7).

Despite those indications of an evolution in the structure of the factors, the structure is stable enough to allow a study of the global modifications of urban social profiles by projecting them on the same factor analysis (the four sets of cities at the four dates in row are described by the same set of variables in column). The corresponding structure (which is an intermediary one between the one of the sixties and the one of the nineties) has been represented on figure 2a according to the position of the main variables. The trajectories which link the representative projection of each city at the four dates on the first two factors are very similar, whatever the initial position of cities in the socio-economic structure (figure 2b). All illustrate the same general trend in socio-economic transformation, which combines a reduction in the industrial activities and an adaptation to the innovations of the period.



Such rather similar changes in city profiles do not alter much their relative position in the urban system. Table 3 gives a general view of the structural stability in the urban system. It compares two cluster analysis made on the same set of variables and cities as above, at a distance of twenty years (at each date, Paris is alone in a class and has not been represented). Even if there have been significant changes in the socio-economic content of each group of cities, as featured by the variables which are either over-or under represented comparatively to the average profile, the subsets of cities which cluster together in the same class at each period tends to be largely the same. We will not comment in detail here the shifts from one group to another, for cities like Lille for instance, which are representative of minor but significant differential changes in the urban trajectories. They can be interpreted both after local specific conditions, but also through the general evolution of urban attractivities.

#### **4 Urban attractivities and social images**

The movement of the attractivities has been represented on figure 2a by projecting as supplementary variables the net migration rates of each period. This allow to visualize the instability of their position regarding to the interurban socio-economic differentiation. If net migration rates were to be interpreted as the direct expression of differentials in urban images, their trajectory could appear at first sight surprising. Indeed, they follow as expected a marked shift from average, slightly industrialised profiles, towards more tertiary ones, but they seem to remain on the wrong side of the second factor, being at the opposite of the indicators of technical innovation. This has to be investigated by other methods than the purely exploratory ones.

In order to get a synthetic appraisal of the relationship between urban image, as revealed by net migration rates, and the characteristics of their socio-economic structure, we experimented a series of multiple regression models, with net migration rates of each period as dependent variable and the proportions of social categories and other indicators as explanatory variables. The model is not stable but rather versatile over time. There was clearly a shift in the attractivity between the first two periods and the last ones, which corresponds to two very different spatial patterns of net migration rates as shown by their correlations over time (0.6 between the rates of 1962-68 and 1968-75 on the one hand and 0.7 between those of 1975-82 and 1982-90 on the other hand, but zero between the rates of the first and the last two periods).

Until 1975, the net migration rate of the cities was not correlated with any feature of their social structure or economic profile. A rather weak link existed with the age structure, the 50-59 years old explaining 11% of variance with a positive effect whereas the proportion of people over sixty had a negative effect, adding 7% more to the R square in a multiple linear regression. During that period of rapid demographic and economic growth, the attractiveness of cities could appear as randomly distributed according to the socio-economic structure of the urban system, since the components of the attractiveness were many: a city could absorb "passively" the surplus of the rural labour force from its still too populated rural surroundings, as well as attract a positive net migration balance from its exchanges with remote regions or other cities. Differentials in attractiveness reflected then various stages in a formerly unequally diffused process of urbanisation.

At the end of the seventies, the process of the rural exodus has come to an end and the net migration rates reveal more the selective character of urban attractiveness. The net benefit from migrations starts to be depending upon the social structure during the eighties only, expressing an attraction on migrations for cities with many self-employed, whereas cities of blue collar workers were repulsive. This corresponds also to a shift in the economic profiles of attractive cities: first, at the end of the seventies, business services appear as an important factor of attraction, then their weight weakens compared to the one of tourism industries and telecommunications. The construction sector appears each time as a factor accompanying urban growth.

There is also since the end of the seventies a clear link between net migration rates and the prices of business offices, as well as the indicator of wealth (after VAT). But neither the general income level nor the salaries can be considered as factors for defining urban attraction. There has been also a reversal in the attractiveness of cities according to their age structure: The oldest category, which was a negative explanation factor of the migration rates during the 1968-75 period has become a positive one afterwards.

How those shifts in attractiveness can be interpreted? One should first avoid the ecological fallacy. The factors explaining the net migrations rates at the level of cities cannot be directly related to the individual motivations for moving. Moreover, such a dramatic change in collective behaviour can hardly be imagined. The shift may more likely reveal an effect of the dynamics of the system of cities itself, which may change the global constraints on the moves of individuals, whereas the behaviour of people is not necessarily changing.

## **5 Towards a dynamic model of urban social trajectories**

If we try to interpret the observed qualitative changes in the structural dimensions of the urban system and the trajectories of the cities, the more recent evolution is rather paradoxical. The social structure of cities which were attractive in the last fifteen years, are the ones where the self-employed are over-represented. This corresponds to an old mode of production, it is representative of a rather obsolete entrepreneurial structure. This social model is also a cultural feature, typical of mediterranean countries, where it resisted longer to the modernisation process of economic structures, as expressed by the diffusion of salaried work and the disappearance of many very small firms.

Our hypothesis is that it is not this obsolete economic structure which suddenly became attractive. We do not believe in a reversal back to an old social model, even if the context of economic crisis of the eighties may have acted as a new incentive for small firms and individual entrepreneurial initiatives. On the contrary, we think that it is the cities themselves which became attractive, despite still having this structure, and for two reasons: first because they were not attained by the main transformations of the industrial revolution, they had none of the negative features, both objective and subjective, attached to the progressive rigidity and obsolescence of those industrial specialisations; second, because their social structure was oriented towards a higher educational level (in order to compensate the lack of local sources of employment, the people accumulated the academic degrees in order to find jobs in the public services or in the administration), they met better the requirement of the main socio-economic innovation of the period, which meant, first of all, to provide a human and environmental context more favourable to the development of technopoles. The city of Montpellier is a good example of such cities, for which only bad predictions could have been made half a century ago, as far as their chances of economic development were concerned, and which are now at the top of the scales for urban image and development prospects.

Such apparent "reversals" in the destinies of cities are actually the normal way for their evolution. It is a peculiarity of the dynamics of geographical systems when compared to economic goods. Contrary to the material products and types of services which are substituting each other during the course of time (Marchetti, 1984), it is the same set of cities competing for "market shares" which are used again and again by the successive innovation waves. To say it in other words, from the point of view of the meso-scale, cities are continuously adapting themselves for capturing the initial advantages of an early adoption of each wave of innovations. It can be expected that in this process some of them will succeed more or less efficiently. Various "generations" of cities having benefited from different successive stages of development can still be identified in many urban systems.

This adaptive property is a major process in the dynamics of urban systems, it explains their main structural features, which may all be related to their basic properties of connectivity and competition in a spatial evolutionary process (Pumain, 1996). An overview of the process can be given on a theoretical representation of the phase space. The structure of the urban system is represented by two dimensions which keep the same general meaning but whose concrete definition is changing over time. Why two main dimensions in this process of adaptation to change? It can be seen as an expression of the delay between actual changes and their perception (figure 3).

The horizontal dimension represents the process of adaptation to the socio-economic or technical innovations of the moment. When cities succeed in keeping with the general rate of urban change, they also get a good image, and maintain a position in the upper right square. This is typical of the actual "large" cities or metropolises whose large size is explained by their successful adaptations to a diversity of innovations cycles at successive periods of time. A city may go out of this virtuous circle, for example in becoming very specialised in one type of innovation. It will gradually shift towards the upper left square, losing of adaptive power but still keeping a good image because of the inertia of collective representations. It is only after a long phase of deterioration of its relative situation that the city will get a bad image, and, because of it, risks of becoming trapped in the vicious circle of decay, in the lower left square of the graph.

In this process, some cities lose their importance, at least in relative terms of size and standards of living, and they cannot compete any longer with their former competitors in the urban hierarchy. There is an inexorable trend leading to the disappearance of cities which were more successful some day, but which have been let aside by several innovation cycles or which have not rapidly enough adapted themselves. This selection process can act randomly - i.e., depending upon purely local or conjunctural factors. But it also can be linked with the structural dimension of the urban systems, as for instance former studies of long-term trajectories of cities have demonstrated (Pumain, 1991). A systematic "bottom-up" simplification of urban hierarchies is caused by the space-time contraction, as the increasing speed of transportation means enlarges the spatial range of the largest centers and the smallest located in intermediary positions are short-circuited, their clients are captured and they lose their rank in the hierarchy. Many examples show that it is sometimes possible to get out of this stage by restructuring the economic activity of the city, and coming back to new cycles of adaptation (figure 3).

Such an interpretation relies on observations of the relative trajectories of cities in the structure, which can hardly be represented in the same factor analysis framework as used above. It has to be tested by developing dynamic models of the evolution of the socio-economic specialisation within an urban system. A first attempt has been made, using a multi-agents simulation system (Bura et al, 1996). This formalism renders however validation difficult. One also could try to build a more classical version of a dynamic model using differential equations.

## **Conclusion**

A fundamental property of systems of cities is the interdependency of their elements, which is clearly revealed by the comparative observation of their socio-economic evolution (Pred, 1977, Pumain, Saint-Julien, 1978). The evolution of a set of cities exhibits phenomena of synergy and coherence which recall characteristic processes of the dynamics of self-organized systems: production of stable structures at a macro-scale from extremely fluctuating interaction processes at the micro-level, long-range correlations in the evolution of individual cities, transformations of the macro-structures by the amplification of small fluctuations (Sanders et al, 1991).

This dynamics is linked with the process of adaptation within the urban system. Most of the adaptation to the change which is produced in various places, within and outside the system, is occurring as a continuous process. "Continuous" mean that it is made of randomly distributed, unprevisible small changes, which are accelerations or delays of the same trends in change, but which do not persist over a time long enough in the same direction to modify the trajectory of one city in a durable way, comparatively to the other cities. The main constraint which is responsible for this distribution of change within the system is its narrow and multiple connections, especially in terms of exchanges of information. The competition between urban actors living in different cities is a strong incentive for a rapid diffusion of most of the innovations.

Social differences between cities are produced slowly by the amplification of slight inequalities or delays in the diffusion of economic changes, whereas in turn they can have a clear role in differentiating the speed of adaptation to further innovations. The interurban social differences induce scaling phenomena in the collective representations, or "images" of the cities, which may reinforce the effects of their "objective" comparative advantages. Nevertheless, as they have a longer persistency in time than the objective conditions of their appearance, they may mislead the predictions about the future of individual cities.

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Table 1: CORRELATIONS BETWEEN SOCIAL GROUPS AND ECONOMIC INDICATORS

CORRELATION COEF. (Prob>F) > 0,01	Year	Year	SELF EMPLOYED MANAGERS	WHITE COLLARS	BLUE COLLARS	NET MIGRATION RATE
OFFICES PRICES	1983	1975	0,48	---	-0,27	---
	1983	1982	0,49	---	-0,31	0,44
	1989	1990	0,51	---	-0,34	0,49
HOUSING PRICES	1983	1975	---	---	---	---
	1983	1982	---	---	---	---
	1989	1990	0,28	---	-0,29	0,29
WEALTH After the tax added value	1971	1975	0,29	0,76	-0,77	---
	1983	1982	0,41	0,71	-0,74	0,38
	1983	1990	0,33	0,54	-0,70	0,47
NET INCOME per inhabitant 1989	1989	1975	---	0,66	-0,66	---
	1989	1982	---	0,63	-0,69	0,35
	1989	1990	---	0,65	-0,67	0,49
WHITE COLLARS SALARY	1975	1975	---	---	---	---
	1987	1982	---	---	---	---
	1987	1990	---	---	---	---
BLUE COLLARS SALARY	1975	1975	-0,32	-0,34	0,38	---
	1987	1982	---	---	---	---
	1987	1990	---	---	---	---
GENERAL SALARY	1975	1975	-0,29	---	---	---
	1987	1982	---	0,29	---	---
	1987	1990	---	0,31	---	---



**Table 2: CORRELATIONS OF VARIABLES WITH THE FIRST TWO FACTORS  
OF THE PRINCIPAL COMPONENT ANALYSIS**

	FACTOR 1				FACTOR 2			
	1968	1975	1982	1990	1968	1975	1982	1990
NET MIGRATION RATE	-0,01	0,10	<b>0,56</b>	<b>0,69</b>	-0,05	-0,09	-0,49	0,01
MANAGERS	<b>0,72</b>	<b>0,76</b>	<b>0,74</b>	<b>0,64</b>	0,51	0,47	0,52	0,68
SELF EMPLOYED	0,23	0,39	0,49	0,42	<b>-0,61</b>	<b>-0,74</b>	<b>-0,72</b>	-0,46
WHITE COLLARS	<b>0,86</b>	<b>0,93</b>	<b>0,92</b>	<b>0,73</b>	0,26	0,21	0,15	0,01
BLUE COLLARS	<b>-0,90</b>	<b>-0,96</b>	<b>-0,96</b>	<b>-0,86</b>	-0,21	-0,18	-0,17	-0,42
FOOD INDUSTRY	0,20	0,27	0,04	0,08	-0,25	-0,12	-0,01	-0,49
ENERGY	0,26	-0,40	-0,39	0,30	-0,22	-0,34	-0,29	<b>-0,57</b>
METALLURGY, MECHANICS	<b>-0,73</b>	<b>-0,71</b>	<b>-0,61</b>	<b>-0,78</b>	0,30	0,25	0,19	0,30
TEXTILE INDUSTRY	-0,39	-0,40	-0,40	-0,38	-0,09	-0,13	-0,05	-0,24
CHEMISTRY	-0,19	-0,21	-0,19	-0,20	-0,15	0,01	0,11	-0,13
OTHER INDUSTRIES	0,26	-0,01	0,30	<b>-0,70</b>	0,13	-0,01	0,14	0,29
TRANSPORTATION	0,13	0,21	0,05	0,19	-0,27	-0,13	-0,06	-0,27
CONSTRUCTION	<b>0,59</b>	<b>0,54</b>	0,37	0,24	<b>-0,51</b>	<b>-0,62</b>	<b>-0,79</b>	<b>-0,60</b>
TELECOMMUNICATION	<b>0,65</b>	<b>0,64</b>	<b>0,62</b>	<b>0,57</b>	0,34	0,35	0,38	0,35
TOURISM	0,34	<b>0,63</b>	<b>0,60</b>	<b>0,61</b>	<b>-0,60</b>	-0,44	-0,46	-0,20
FOOD RETAILING	-0,15	0,09	0,21	-0,04	<b>-0,60</b>	<b>-0,52</b>	<b>-0,68</b>	<b>-0,83</b>
WHOLESALE	<b>0,57</b>	<b>0,68</b>	<b>0,61</b>	<b>0,69</b>	-0,23	-0,05	-0,01	-0,18
OTHER RETAILING	<b>0,64</b>	<b>0,64</b>	0,44	0,47	-0,49	-0,54	<b>-0,70</b>	-0,54
BUSINESS SERVICES	0,48	<b>0,64</b>	<b>0,70</b>	<b>0,62</b>	0,14	-0,18	-0,12	0,22
BANKING	<b>0,67</b>	<b>0,64</b>	<b>0,60</b>	<b>0,56</b>	0,32	0,36	0,36	0,28
PUBLIC SERVICES	<b>0,71</b>	<b>0,79</b>	<b>0,71</b>	<b>0,61</b>	0,19	0,35	0,37	0,35
OTHER SERVICES	<b>0,88</b>	<b>0,82</b>	<b>0,80</b>	0,20	-0,08	0,05	0,02	-0,63

Source: INSEE, Equipe P.A.R.I.S.

Table 3: EVOLUTION OF FRENCH CITIES BETWEEN 1968 AND 1990

SPECIALISATION Index		2817	287	220	993	925	2361	877	1425
SPECIALISATION Index		2817	287	220	993	925	2361	877	1425
1990	>	Self - employed Food industry Tourism	Télécommu- nications Banking	Employed Public services	Managers Business Services	Blue Collars	Textile Industry Blue Collars	Food industry Others Services	Metallurgy, mechanics Others Industries
1968	<				Blue Collars Wholesale	Managers Banking Public services	Managers White Collars		
>	<	Grasse Nice Avignon Bayonne Beziers Perpignan	Arras Chambéry Charleville Dijon Le Mans Nevers Périgueux Quimper Saint-Brieux	Amiens Angoulême Besançon Caen Chartres La Rochelle		Mulhouse St-Etienne		Boulogne- sur-mèr	
Self-employed Tourism	White Collars Others Services		Colmar Limoges Marseille Nancy Orléans Rouen Strasbourg Tours Valence						
513	673								
488	176								
235			Lille			Maubeuge St-Chamond Thionville	Calais Roannes Troyes		Montbéliard
619				Belfort Bourges Brest Lorient Tarbes Toulon	Chateauroux	Cherbourg Saint-Nazaire Valenciennes	Châlon- sur-Saône		
1688			Clermont- Ferrand	Montluçon			Béthune		
1641			Reims			Douai Dunkerque Le Havre	Forbach Lens		

(Clustering tree)

> : Over representation  
< : Under representation

FIGURE 1: EVOLUTION OF THE SOCIO-ECONOMIC STRUCTURE OF THE FRENCH URBAN SYSTEM

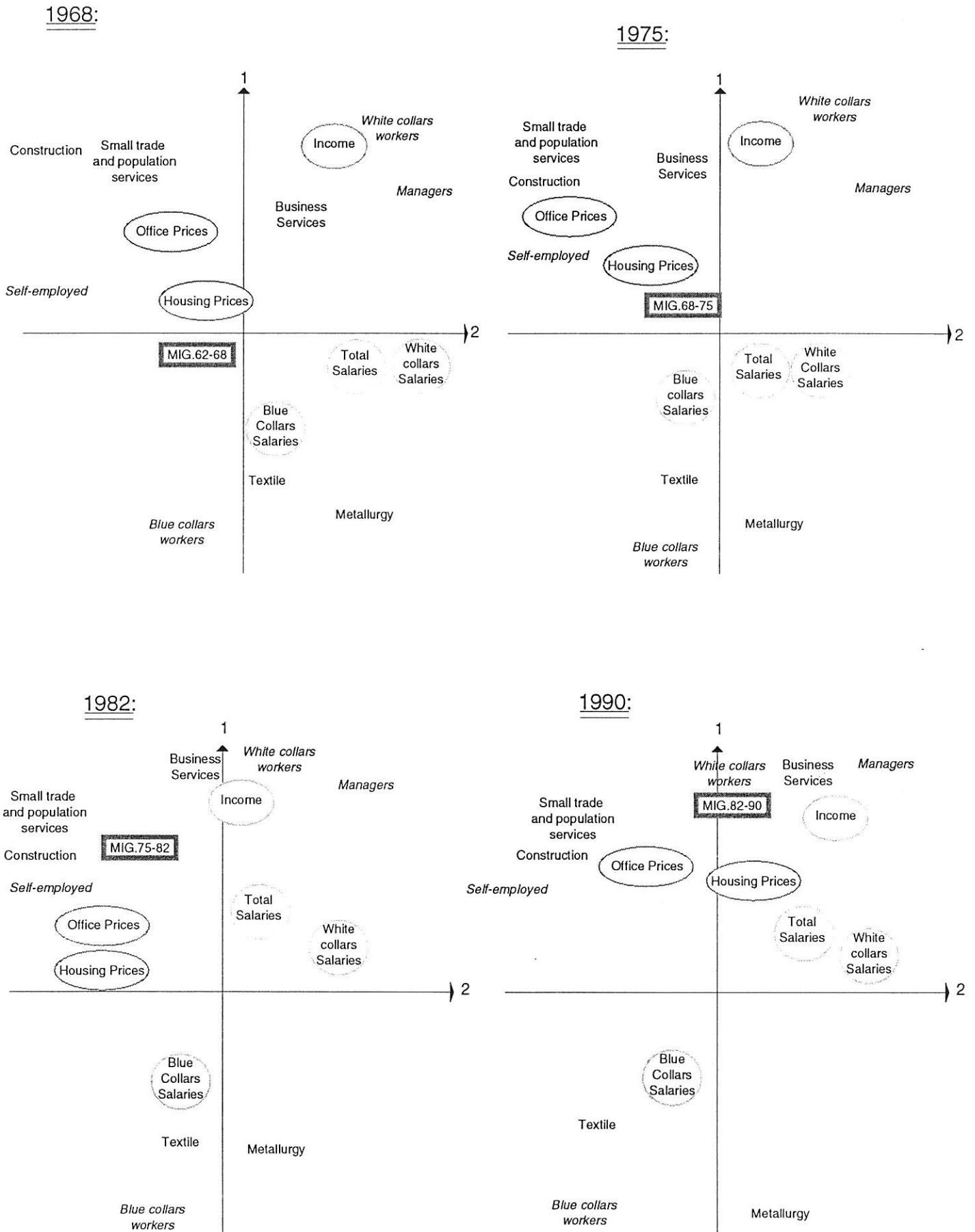


Figure 2.A: TRAJECTORY OF THE ATTRACTIVITY OF CITIES  
IN THE MULTIVARIATE PHASE-SPACE OF SOCIO-ECONOMIC  
ADAPTATION AND ITS PERCEPTION

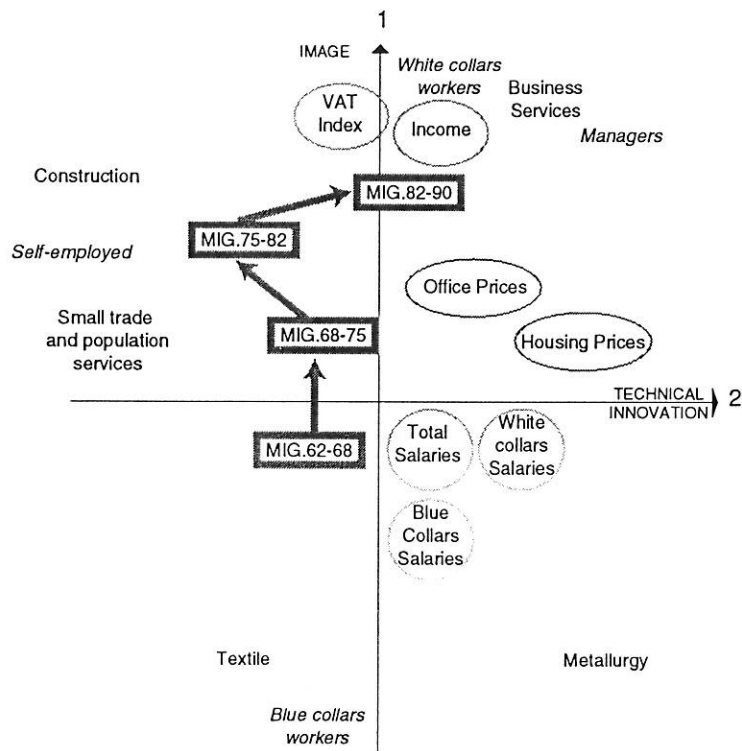
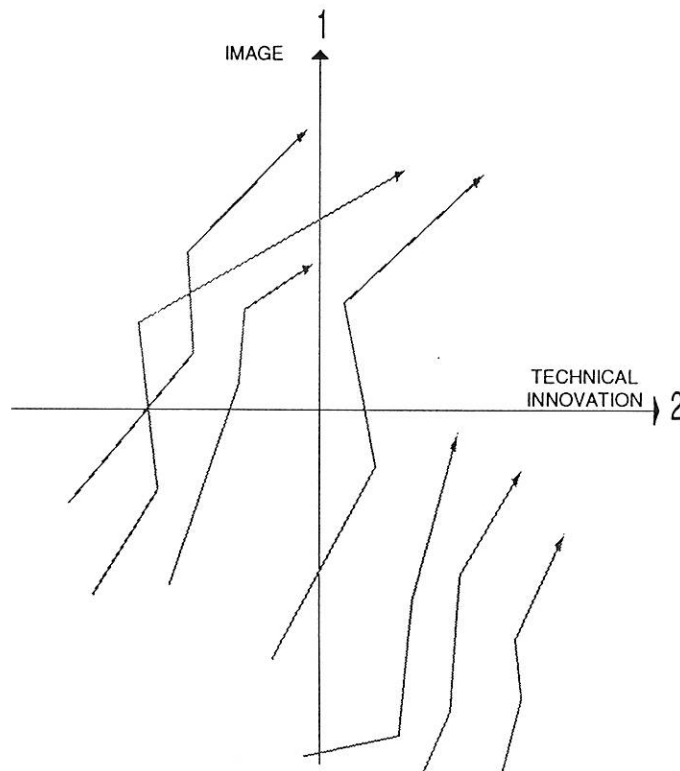


Figure 2.B: ABSOLUTE TRAJECTORIES OF CITIES  
IN THE PHASE-SPACE OF FIGURE 1



**Figure 3: TENTATIVE INTERPRETATION OF THE TRAJECTORIES OF CITIES IN THE PHASE-SPACE OF ADAPTATIVE PROCESS**

