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Well-being Disparities Within the Paris Region.

A Capabilist Spatialized Outlook[1]

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Résumé

Les récentes émeutes urbaines qui ont embrasé la France en 2005 ont attiré l'attention sur les déterminants spatiaux du mécontentement social. Nous étudions la validation empirique du sentiment collectif d'une très forte augmentation des disparités de bien-être entre les communes franciliennes. Nous fondons notre indicateur de bien-être sur une version spatialisée de l'approche capabiliste de Sen. Celle-ci permet de tenir explicitement compte du rôle joué par la localisation résidentielle sur les réalisations, les opportunités et la liberté de choix des individus. En mobilisant des indicateurs multidimensionnels de pauvreté et à l'aide de l'analyse exploratoire des données spatialisées, nous montrons que le bien-être capabiliste spatialisé a augmenté entre 1999 et 2006. Par ailleurs, nous mettons en évidence un phénomène de rattrapage des communes les plus favorisées par les communes les plus défavorisées. Cependant, nous mettons également en lumière la forte polarisation des niveaux de bien-être les plus faibles sur le territoire francilien. Le fait que cette polarisation ait augmenté entre 1999 et 2006 et que certaines des communes les plus défavorisées aient vu leur niveau de bien-être diminuer pendant cette période pourrait expliquer la croyance collective d'une augmentation de la fracture socio-spatiale en Île-de-France.

Abstract

Urban riots, such as in France in 2005, have drawn attention on the spatial determinants of social discontent. We provide evidence on the pervasive collective perception of a dramatic increase of the well-being disparities within the Paris Region during the decade preceding the 2005 riots. We ground our well-being indicator on a spatialized version of Sen's normative capabilist approach, which allows to explicitly take into account the impact of one's localization on one's realizations, opportunities and freedom. Then, using multidimensional poverty indicators and ESDA, we show a global improvement of the Paris region municipalities' Capabilist Spatialized well-being (CaS) between 1999 and 2006 as well as a catching-up phenomenon between advantaged and disadvantaged municipalities. Nevertheless, we also find a growing cluster of very disadvantaged municipalities, some of which have witnessed a decrease of their CaS level. This evidence may explain the belief of a growing socio-spatial fracture within the Paris region.

Mots-clef : bien-être capabiliste, disparités socio-spatiales, Île-de-France

Key-words : capabilist well-being, socio-spatial disparities, Paris region

1. Introduction

The violent expression of social discontent often reminds governments that well-being and inequality issues are at the heart of their citizen's preoccupations. Growing inequalities or a steady declining purchasing power may lead to violence and revolution, as can be witnessed by the current events taking place in Northern Africa and the Middle East. Urban riots are a form of violent protest that encompasses field battles between rioters and the police, car burnings or the damaging of local public goods. Over the past few years, France has repeatedly suffered several violent episodes of urban rioting, to the point of making the international headlines in 2005 when the government declared the state of emergency in several municipalities of the Paris region (Clichy-sous-Bois, Villers-le-Bel, and others). Urban unrest occupies a prominent position in the French political representations; it is believed to be directly related to the growing social disparities between the French cities' neighborhoods. French citizens are keenly aware of the social differences between “good” and “bad” neighborhoods and one's residential localization is a key determinant not only of one's immediate income but also of one's future opportunities, in particular for education or job accessibility (Maurin, 2004). Even if such a differentiated representation of the urban space is not new (in 1845 Engels raised the question of London's “bad neighborhoods” and the Chicago sociologists began to study the concentration of underprivileged populations in certain sections of Chicago's territory as early as the 1920s), the French ideological context is particular. In France, the cities' socio-spatial differentiation is perceived as a menace to the social cohesion of the entire French society itself, an a threat against the “Republican Pact” that is based on the shared ideal of a society formed by free citizens that must be not only political but also social equals.

In this paper, we question the empirical reality of the widespread opinion that the socio-spatial differentiation of French cities has recently suffered a dramatic increase that could explain such extreme events as the 2005 urban riots. We focus on the Paris region, where the riots began and were the most intense. To do so, we develop an original multidimensional and explicitly spatialized measure of the neighborhoods inhabitants' well-being based on Amartya Sen's capability approach, where we not only take into account the income dimension of individual well-being, but also the opportunities that derive from one's residential location.

The paper is organized as follows. In the next section (Section 2), we discuss our definition of a Capabilist Spatialized well-being (CaS) index. In Section 3, we propose a statistical specification of each of its three dimensions (effective realizations, well-being as freedom and

freedom of choice) for the population of all 1300 municipalities (*communes*) of the Parisian region. To do so, we use fiscal and census data for the years 1999 and 2006. Dimensions such as retail accessibility, education, geographically-based discrimination, housing comfort or vote rights are mobilized. Then, we study in Section 4 the spatial distribution of CaS levels across the Parisian region neighborhood in 2006. In Section 5, we provide evidence on its evolution between 1999 and 2006. Section 6 concludes on the empirical validation of the hypothesis of a dramatic increase of the socio-spatial differentiation of the Paris region during the last decade.

2. Measuring well-being from a spatialized point of view: a normative discussion

Assessing individual well-being can be done from very different normative points of views: the individuals' subjective happiness in classical utilitarianism, their ordinal preference satisfaction in Paretian utilitarianism, incommensurable individual freedom in Nozick's libertarianism... What should be the characteristics of an informational basis that relevantly assesses well-being *from an explicitly spatialized point of view*? Sen's capability approach seems to be the most promising one, since it makes it possible to overcome certain limitations of the standard measurement of well-being in economics, namely utility. Before advocating our case for an explicitly spatialized version of Sen's capability approach we very briefly present the utilitarian point of view on individual well-being measurement.

Utility is an individualist and consequentialist normative framework in which the ethical evaluation rely solely on the consequences of outcomes on individuals – as opposed to deontological normative frameworks (such as John Rawl's conceptual framework, for example) where the respect of general rules and principles are also taken into account.

Utilitarianism is based on an hedonistic conception of individual well-being. In Bentham's first formulation of utilitarianism, utility, which is the information basis of individual well-being, results from a "*felicific calculus*" that computes 14 pleasures and 12 pains[2] (Bentham, 1781). For Bentham, all that matters from a moral point of view is one's subjective happiness, that is, one's utility. In this first version of utilitarianism, *cardinal* utilitarianism, it is possible to quantify the level of happiness felt by individuals, but also to make interpersonal comparisons and to compute the sum of total happiness of a society. Right from the outset, this conception of utility was widely criticized. Blind to the qualitative differentiation of well-

[2] Pleasures are: of the senses, of wealth, of skill, of amity, of a good name, of power, of piety, of benevolence, of malevolence, of memory, of imagination, of expectation, dependent on association, of relief. Pains are: of privation of the senses, of awkwardness, of enmity, of an ill name, of piety, of benevolence, of malevolence, of the memory, of the imagination, of expectations dependent on association.

being, it has sometimes been caricatured as "*a doctrine worthy only of swine*" (John Stuart Mill, 1863, discussing Thomas Carlyle's arguments). One can also question interpersonal comparisons of utility: from which standpoint is it possible to say that the happiness of one individual is more worthy than that of another? After Mill's amendments, cardinal utility becomes ordinal utility, and the focus shifts from computed quantitative levels of happiness to the satisfaction of *ordered subjective preferences*. Brandt specified in 1979 that these are rational and informed preferences, or, rather, "*informed desires that do not disappear after therapy*." At any rate, whatever the version, utility remains subjective by nature and depends on individuals' desires and preferences.

As far as the statistical specification of utility is concerned, economists traditionally use the level of income as an indicator of the degree of preference satisfaction. This stance is not as simplistic as it may seem, especially if one keeps in mind that, historically, the first function ascribed to money in economics is that of a standard of measurement of the value accorded to goods and services. In a situation of scarcity, prices (including wages) result from the confrontation between the preferences of those who offer and those who ask for rare things (goods and services, labor, capital). Using levels of income to approximate one's happiness means using the very metric through which the aggregation of individual preferences is worked out in a given society at a given moment in time.

Utilitarianism has many interesting characteristic – among others, its individualist, consequentialist and hedonist normative foundation and its easy statistical specification. However, it is also riddled by a number of limitations (Sen, 1979, 1985a, 1985b) that, in our opinion, makes its use unsuitable to assess well-being from an explicitly spatialized point of view.

First, in the utilitarian approach, well-being is assessed from the individuals' level of utility and is defined from a purely *subjective* point of view, which leads to overestimate the happiness of the worst-off in relation to their real, objective situation. Sen's objection rests on the *adaptative preferences* hypothesis: because they obey to a *reality principle*, individuals adapt their preferences to what they think they actually *can* obtain. In this context, using an utilitarian metric for individual well-being may lead to overestimating the utility of those that grew in an underprivileged household, since they may not be as demanding as others in their preferences or goals and consider themselves happy (or satisfied) with lower actual achievements. At an extreme, American sociologists D. S. Massey and N. Denton (1993) explained how ghetto-specific cultures can prevent ghetto-raised individuals from internalizing the dominant social norms, making them unsuitable and unprepared for life

outside of the ghetto's boundaries. In this context, assessing individual well-being with a subjective informational basis such as utility seems improper, and Sen's objection reaches an even greater relevance.

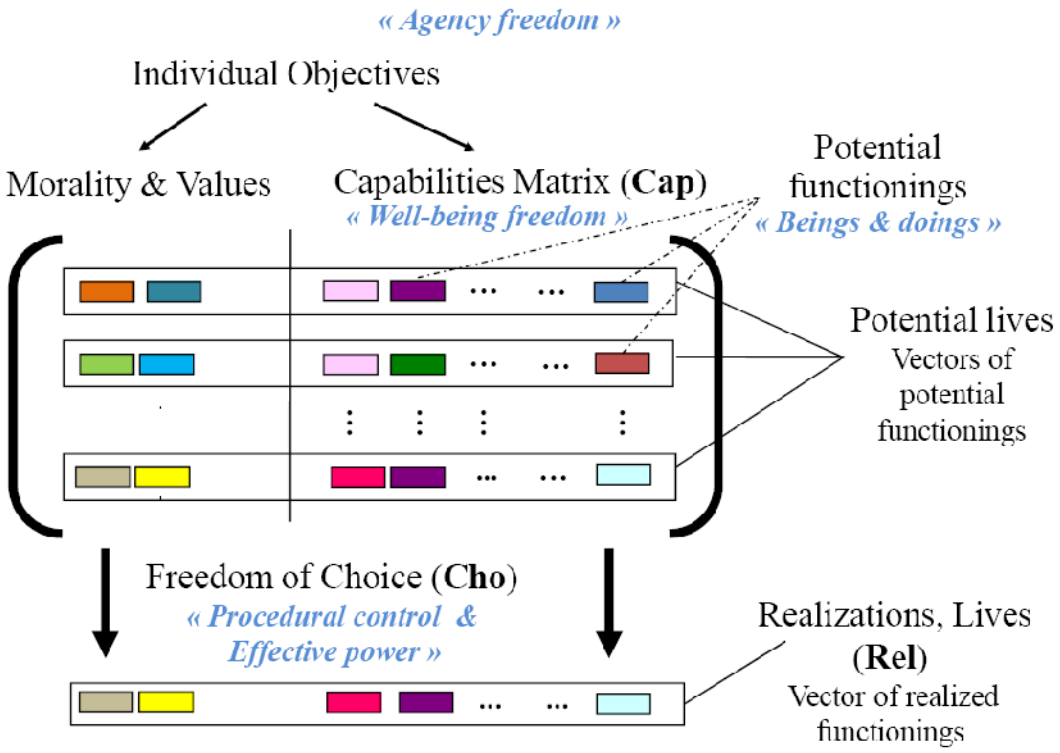
Second, utility relies exclusively on individual happiness (or preference satisfaction) and does not explicitly take into account other relevant dimensions such as individual freedom or opportunities. This is problematic since the influence of residential spatial location on one's opportunities is a widely theorized and empirically established fact. For example, the extensive Spatial Mismatch literature that stemmed from Kain's seminal work (Kain, 1968, 1992) shows how poor job accessibility and one's residential neighborhood's social composition can have a determinant impact on one's outcomes on the labor market[3]. In a fully spatialized framework, we need to take into account space as a potential determinant of well-being: acknowledging what Soja (2010) calls one's "ontological spatiality", we agree with the statement that *homo œconomicus* is also *homo geographicus* (Sack, 1997)[4]. From an empirical point of view, Sagot (2001) studied for the Parisian region the respective role of individual characteristics (diploma, household structure, occupation...) and housing variables (size, comfort...) and the social characteristics of the neighborhood of residence on one's income. She shows that beyond individual specificities, space, through housing and the social characteristics of the neighborhood of residence, is a discriminant factor between households who belong to identical social groups. Here, we therefore postulate that beyond utility, residential location constrains both one's *freedom* (through, for example unequal accessibility to jobs or to consumption) and one's *opportunities* (through local peer effects of discrimination). To take all these elements into account, we therefore advocate for a *multidimensional* conception of well-being.

More specifically, we find Sen's capabilist approach particularly interesting. Sen's definition of well-being is *multidimensional*, *opportunities-oriented* and *partially objective*. Sen (1985a, 1985b, 1993) emphasizes three key elements of well-being: well-being as effective realizations (Rel), well-being as freedom (Cap) and well-being as choice or agency freedom (Cho) (see *Fig. 1*).

Figure 1. A representation of Sen's capabilist approach

[3] See Gobillon *et al.* (2007) and Dos Santos *et al.* (2010) for recent reviews on the theoretical and empirical Spatial Mismatch literature.

[4] Sack (1997, p.10) opposes the "thick" places found in traditional societies, such as the village green, which can support a variety of social functions, to the "thin" spaces found in modern societies, which are fragmented and where each place is assigned a specific function (sleeping, eating, studying, entertaining, working, and so on). He contends that one becomes aware of space only when it displays a deficiency which prevents the social process it contains from unfolding.



- First, one's **well-being as realizations** (Rel) refers to one's achievements in the many relevant dimensions that depict one's existence. It is measured using the vector of realized "beings" and "doings" (i.e., *functionings*) that describe the full scope of one's existence both from a material and a moral point of view (for example, "being educated", "being adequately housed"...);
- Beyond one's actual list of realized functionings, Sen argues that a comprehensive well-being metric should also take into account the quantity, quality and variety of the totality of one's potential achievements. Doing so means accounting for one's **well-being as freedom,** which can be represented by two matrices, one relating to one's moral and values while the other, the **capability matrix** (Cap), is the set of all potentially accessible "material" vectors of functioning;
- The last dimension of individual well-being, **freedom of choice** (Cho), which Tovar (2008) calls procedural freedom, accounts for one's amount of procedural control and effective power when choosing one's realized functioning from the set of all potentially available ones.

The capabilist normative framework explicitly takes into account realizations, opportunities and agency freedom, all three dimensions of one's well-being that are bound to being strongly affected by one's residential location. However, because it was developed from a general, a-spatial point of view, Sen's approach cannot be directly implemented to do so. In

the next section, we propose a "spatialized" version of Sen's capabilist well-being, along with an empirical specification based on French census data.

3. Measuring a capablist well-being level for all Parisian municipalities

In this section, we first define which elements should compose an explicitly spatialized well-being indicator (CaS) and propose an empirical specification based on French micro-data for the Parisian region[5]. From such a multidimensional informational basis, we then discuss the strategies available to derive a unidimensional assessment of each Parisian region's municipality CaS well-being levels.

3.1. Operationalizing the capability approach: some methodological issues

Attempting to give an empirical content to a capabilist well-being index raises numerous difficulties. Although they cannot be fully addressed in this paper[6], lets overview them succinctly.

First, the (partially) objective nature of the capability approach brings up the thorny question of its *paternalism*: how can a scientist claim that he or she is perfectly objective when choosing the relevant functionings and statistical indicators that will be used to specify a capabilist well-being? To deal with this objection, Sen advocates for a "*positional objectivity*" (Sen, 1985b, 1993) in which the informational basis components must be rigorously discussed and must evolve with the critiques. Contrary to Nussbaum's opinion, this means rejecting the idea of a finite list of functionings and endorsing contextually-defended *ad hoc* specifications. In this paper, we adhere to this point of view by proposing an explicitly "spatialized" take on the capability approach.

At another level arises the problem of the assessment of freedom of choice, which is counter-factual by nature (Comim, 2001). Ideally, one should be able not only to list all the vectors of potential functionings that describe human life, but also to value them one by one and to appreciate their diversity, all within a temporal horizon as far as the end of each individual's life (Brandolini and d'Alessio, 1998). A solution favored in the empirical capabilist literature consists in inferring an assessment of the capability set (Basu, 1987 and Basu and López-Calva, 2002) from realized functionings. This "second best" strategy is

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5 For an early spatialization if Sen's capability approach, see Tovar (2008, 2010).

6 For a comprehensive discussion of the methodological difficulties met with by all researchers willing to concretely apply the capabilities approach, see Robeyns (2005b); Alkire (2008); Comim (2001); Tovar (2008).

tolerable only if such selected realized functionings clearly determine one's future opportunities – such as education, for example or, in a spatialized context, job accessibility.

At any rate, it is clear that any specification of the capabilist well-being will be unsatisfactory by comparison with the richness of its theoretical definition. However, it can be argued that despite its flaws, a capabilist operationalization remains theoretically more relevant than the traditional monetary, uni-dimensional proxy of utility (that is, income).

To fully operationalize the capability approach, we follow Robeyns (2005a and b) and proceed in two steps: 1) defining and specifying a short list of appropriate functionings for assessing one's spatialized capabilist well-being and 2) choosing the best aggregative strategy of such a multidimensional informational basis.

3.2. An explicitly Spatialized Capabilist well-being indicator (CaS): definition and specification

To define a spatialized version of Sen's capabilist well-being, we try and pick functionings that, in all Rel, Cap and Cho dimensions, are keyed to residential location. Of course, not all functionings are thus location-bound, for we do not advocate that one's life outcomes and possibilities are exclusively spatially-determined. table 1 below presents the realized functionings that we have used to account for each of the three dimensions of capabilist spatialized well-being, as well as the statistical indicators that we have used to specify them. Ideally, these indicators should be assessed at the individuals' level. However, given the confidentiality-related constraints that affected geo-localized individual data for the 1999 year at the time of our study, we have used data measured at the municipalities level (municipalities and central district *central district neighborhoods*) so that our results deal with the population of each municipality rather than with each of the individuals within that unit. For the elements that are affected by residential location, the table's background shifts to light gray.

Table 1. Specification of the capabilist spatialized well-being of the Paris region municipalities

CaS dimensions	Functioning	Statistical indicator
Cap Well-being as freedom	(Cap 1) Having a good education	Population's average education level (adjusted for age structure)*
	(Cap2) Being part of a diversified social environment	Social diversity of the municipality during the day (among individuals that work in the municipality)*
		Social diversity of the municipality during the day (among individuals that live in the municipality)*
	(Cap 3) Being mobile	Weighted indicator of the quality of mobility*†●
Cho Choice Freedom	(Cho 1) Not being discriminated against	Presence of a zone identified as a target for urban policy§
	(Cho 2) Having the means to influence public decisions	Proportion of the population that has the right to vote*
Rel Well-being as realizations	(Rel 1) Having a decent income	Average income per taxable household (€)#
	(Rel 2) Having decent housing conditions	Average number of persons per room*
		Living accommodations sanitary equipment*
		Proportion of the population living in a house*
	(Rel 3) Being integrated on the labor market	Indicator of the stability of the jobs of the individuals that live in the municipality*
	(Rel 4) Being close to services and consumption	Indicator of accessibility to the totality of retail stores and administrative services accessible under 20 minutes by public transportation∞

Sources: * Census data (INSEE),† Île-de-France's Equipment Regional Direction (Direction Régionale de l'Équipement d'Île-de-France), ● Île-de-France's Public transportation syndicate (Syndicat des Transports d'Île-de-France), § City Ministry (Ministère de la Ville) and INSEE, # Taxes General Direction (Direction Générale des Impôts) and INSEE, ∞ Local Knowledge of the Productive System Survey (INSEE).

Let's briefly present the selection of functionings we have chosen to assess our Capabilist Spatialized Well-being informational basis and the data used to specify them (descriptive statistics are provided in table2). Following Sen, we try an focus on a small list of essential functionings, rather than trying to provide an exhaustive but potentially redundant one.

First, to capture a municipality's population effective realizations (dimension "Rel"), we rely on four functionings. "*To have a decent income*" (Rel1) is specified using the average income per taxable household (in 2006 euros) available for 1999 and 2006 for 1285 (over 1300) municipalities of the Paris region. "*To have decent housing conditions*" (Rel2) equally combines census data on the average number of persons per room, the sanitary equipment within each living accommodation and the proportion of the population living in a house. The former two indicators depict housing comfort while the later one reflects how the collective desire for individual lodgings is met in the municipality. After housing conditions, the a-spatial functioning "*To be integrated on the labor market*" (Rel3) deals with employment quality. It is approximated by a census-derived indicator of the population's job stability (built using the weighted proportions of very stable, stable and unstable jobs held by the municipality's population). Finally, the quality of the municipality's location within the region's space is appreciated through the functioning "*To be close to services and consumption*" (Rel4) and specified with an accessibility indicator that measures the number of retail stores and administrative services accessible under 20 minutes by public transportation.

Second, welfare as freedom is also measured, as discussed above, using realized functionings. Three ones are helpful to try and this dimension of Sen's normative framework. The first one is "*To have a good education*" (Cap1). Education (here measured as the municipality's population average education level, adjusted for age structure) is very often presented as a key feature of one's capabilities. Of course, there is a strong correlation between education and one's job and wealth expectations and realizations, but what is more essential is that the better educated are also those that are the most likely to easily acquire any further skills needed to pursue their objectives: education deepens the scope of one's potential realized lives, i.e., one's capability matrix. The second functioning is "*To be part of a diversified social environment*" (Cap2). This functioning means to capture the very basic idea that interacting with diverse people broadens one's horizons and enlarges the number or different realizations that one would consider acceptable for each functioning. Cap2 (measured as a Gini coefficient of socio-economic groups' proportions) is specified both for the working (diversity during the day) and the living population (diversity at night) of each

municipality. Finally, because space creates distance and frictions between individuals, jobs and institutions, we need to summon a functioning to assess its influence on one's opportunities. "*To be mobile*" (Cap3) reflects one's opportunity to overcome spatial constraints and actually achieve many of one's potential functionings. To specify this functioning, we average the municipality's proportion of individuals that belong to a household that owns a car and a dummy indicator equal to 1 if there is a public transportation rail station in the municipality (metro, suburban trains) and 0 otherwise.

Third, we two functionings account for the agency freedom (Cho) dimension of our spatialized capabilist well-being indicator. The first one, "*Not to be discriminated against*" (Cho1), relates to the fact that the population of some municipalities may suffer discrimination on the education, the housing or the labor markets, as some recent studies have shown for Île-de-France municipalities (see Petit, forthcoming). Urban public policies are specifically targeted to the particularly destitute neighborhoods where the population is often stigmatized and discriminated against. To roughly approximate Cho1, we use a dummy equal to 1 where there the municipality hosts at least one area specifically targeted by urban public policies and equal to 0 where it hosts none of these areas. Lastly, we try and provide a very basic measure for the control that each municipality's population has on its destiny with the functioning "*To have the means to influence public decisions*" (Cho2) which is simply measured as the proportion of the municipality's population that has voting rights (i.e, that is French and above 18 years old).

Table 2. Descriptive statistics

1999	Min	1st Qu.	Median	Mean	3rd Qu.	Max
REL1	10069	16288	18902	20496	22522	90558
REL21	0,50	0,99	1,00	0,99	1,00	1,00
REL22	0,84	0,97	0,98	0,97	0,98	1,00
REL23	0,01	0,71	0,92	0,79	0,97	1,00
REL3	11,70	13,42	13,71	13,62	13,90	15,11
REL4	0	101	317	2064	1417	103447
CAP1	0,28	0,41	0,45	0,46	0,50	0,71
CAP21	0,54	0,82	0,86	0,85	0,90	1,00
CAP22	0,37	0,41	0,43	0,43	0,44	0,58
CAP3	0,27	0,46	0,48	0,60	0,88	0,99
CHO1	0,00	1,00	1,00	0,91	1,00	1,00
CHO2	0,63	0,91	0,95	0,94	0,97	1,00

2006	Min	1st Qu.	Median	Mean	3rd Qu.	Max
REL1	13663	23710	27825	29887	32792	141062
REL21	0,06	0,12	0,13	0,14	0,15	0,25
REL22	0,94	0,99	0,99	0,99	1,00	1,00
REL23	0,00	0,31	0,33	0,31	0,34	0,36
REL3	11,79	13,64	13,88	13,80	14,08	14,88
REL4	0	253	588	1871	1674	61115
CAP1	10,22	13,44	14,54	14,64	15,68	20,25

CAP21	0,46	0,74	0,82	0,82	0,89	1,00
CAP22	0,52	0,73	0,80	0,80	0,86	1,00
CAP3	0,25	0,47	0,48	0,61	0,87	0,99
CHO1	0,00	1,00	1,00	0,91	1,00	1,00
CHO2	0,61	0,93	0,96	0,94	0,97	1,00

3.3. From a multidimensional informational basis to an uni-dimensional CaS level

Once the list of all statistical indicators relevant to specifying a spatialized capabilist well-being is established, the next step is to decide on an aggregation strategy for such a multidimensional informational basis (Brandolini and d'Alessio, 1998). To compare the CaS levels of Parisian municipalities, we could rely on completely disaggregated strategies: for example, we could use data analysis techniques such as hierarchical ascendant classification to compare and contrast the municipalities' well-being profiles. In this paper, we choose to follow a fully aggregative strategy and use synthetic multidimensional indicators of well that have recently been developed in the literature (UNDP, 1995, Bourguigon and Chakravarty, 2003, Silber and Chakravarty, 2008). For each of the 1,300 municipalities i (municipalities and central district neighborhoods) of the Paris region, we build an index of aggregated well-being which synthesizes the information contained in the vector of scores x_{ijk} obtained by i in the whole set of statistical indicators j_k that describe each of the three dimensions $k = Cap, Cho, Rel$ of the Capabilist Spatialized well-being. To do so, we proceed in 5 steps.

Step 1: Making indicators commensurable by using a linear valuation function

Since the statistical indicators presented in table 1 are different in nature (percentages, binary indicators, absolute values...), it is necessary to make them commensurable prior to their aggregation. To do this, we use a linear valuation function often used in the economic literature, in particular in the work carried out by the United Nations Development Program (UNDP, 1995). This function is defined as follows:

$$v_{ij_k}\left(x_{ij_k}, minx_{ij_k}, maxx_{ij_k}\right) = \frac{x_{ij_k} - minx_{ij_k}}{maxx_{ij_k} - minx_{ij_k}} \quad (1)$$

For each indicator j_k, this linear function measures the deviation between the score x_{ij_k} of municipality i and the lowest score recorded (whether in 1999 or in 2006) $minx_{ij_k}$, expressed

as a percentage of the difference between the lowest score $minx_{ijk}$ and the highest score $maxx_{ijk}$ recorded (whether in 1999 or in 2006)[7].

Step 2: Aggregated level of the Rel, Cap and Cho dimensions of CaS well-being

Then, for each dimension $k = Cap, Cho, Rel$, we measure the level of well-being d_{i_k} reached by municipality i using of a weighted average of scores v_{ijk} obtained by i for all the indicators j_k used to specify dimension k.

$$d_{i_k} = (v_{ij_k}, p_{j_k}) = \frac{\sum_{j_k} p_{j_k} v_{ij_k}}{\sum_{j_k} p_{j_k}} \quad (2)$$

Within each dimension, we give the same weight p_{j_k} to each of the realized functionings listed in table 1 above. Within each functioning, if several statistical indicators are used, we attribute an identical weight to each of them.

Step 3: Unidimensional level of CaS well-being

We aggregate the levels of well-being d_{i_k} obtained in each of the three dimensions $k = Cap, Cho, Rel$. Designated by CaS_i, the multidimensional well-being index refers, for each municipality i, to a weighted average of the levels of well-being d_{i_k}:

$$CaS_i^{\alpha,\beta} = \frac{1}{3}\left[\sum_{k=1}^{3} p_k d_{i_k}^{\beta}\right]^{\frac{\alpha}{\beta}} \quad (3)$$

where:

- p_k is the weight given to the dimension k of the Capabilist Spatialized well-being
- $\alpha \geq 1$ is a parameter of aversion to poverty
- and $\beta \geq 1$ a parameter of complementarity between the dimensions k

Step 4: Parameter specification

As detailed by Bourguignon and Chakravarty (2003) and Chakravarty and Silber (2008), the axiomatic properties of the indicator CaS depends on its parameters α and β. The α parameter depicts CaS' aversion to poverty. Because CaS' additive nature guarantees that the Sub-Group Decomposability principle (DSG) is verified, the condition $\alpha \geq 1$ means that CaS meets the Unidimensional Transfer Principle (UTP). Given $\alpha \geq 1$, the condition $\beta \geq 1$ ensures that CaS is consistent with a Multidimensional Transfer Principle (MTP). β is a parameter of complementarity between CaS's three dimensions *k*. Bourguignon and Chakravarty show that

[7] The lowest and highest scores are recorded pooling the 1999 and 2006 scores for all municipalities in order to allow for comparability of our results between 1999 and 2006.

if (DSG) is satisfied and $\alpha \geq 0$, CaS dimensions *m* and *l* are substitutable if $\alpha \geq \beta \geq 0$ and are complementary otherwise. Here, we choose to allow for substituability between CaS' dimensions, so we set the condition:

$$\alpha \geq \beta \geq 1 \quad (4)$$

In this paper, CaS is computed with $\alpha = 2.5$ and $\beta = 1.5$. Our results are robust to parameter specification (see table 3).

Table 3. CaS' Moran coefficient for different values of the parameters α and β

		Parameter α					
	1999	**1**	**1.5**	**2**	**2.5**	**5**	**10**
Parameter β	**1**	0.0746	0.1324	0.1376	0.1426	0.1614	0.1693
	1.5	0.1155	0.1183	0.1212	0.124	0.1366	0.1467
	2	0.1155	0.1186	0.1199	0.121	0.1233	0.1208
	2.5	0.1239	0.1258	0.1272	0.128	0.1257	0.1069
	5	0.1444	0.1488	0.1525	0.1556	0.1609	0.1392
	10	0.1481	0.1525	0.1565	0.1598	0.1664	0.1465

		Parameter α					
	2006	**1**	**1.5**	**2**	**2.5**	**5**	**10**
Parameter β	**1**	0.2502	0.2434	0.2369	0.2308	0.2079	0.1899
	1.5	0.2327	0.227	0.2214	0.2161	0.1944	0.1744
	2	0.2327	0.2203	0.2159	0.2116	0.1921	0.1686
	2.5	0.2226	0.2198	0.2168	0.2137	0.198	0.1719
	5	0.2373	0.2419	0.2462	0.2501	0.2644	0.2654
	10	0.2577	0.2682	0.2784	0.2882	0.3303	0.3752

		Parameter α					
	Variation (%)	**1**	**1.5**	**2**	**2.5**	**5**	**10**
Parame							

ter β

Step 5. Weights specification

Many possibilities for the weights specification are discussed on the literature. A first one is to compute the results stemming from all possible weight combinations and study their implications, selecting *in fine* the one that provides with the "*best*" results (according to a chosen normative criterion). Because this method often leads, in practice, to partial orderings, it is not very satisfactory.

A second possibility is to give an equal weight to all dimensions (such as in Townsend, 1979 or Mayer and Jenks, 1989). The main argument in favor of such a weighting system is that there is no consensual on the matter, and that differentiating the dimensions' weights would only reflect one's personal and therefore illegitimate take on their relative importance. A third possibility is to use market prices to approximate a collective valuation of each dimension. Although interesting, such an alternative is often impossible to put into practice since the point of using a multidimensional definition of well-being is precisely to value its non-monetary dimensions, for which there are, by definition, no market prices. A last possibility is to statistically infer the relative weight of the dimensions from the data themselves, either by using multivariate techniques of factor reduction as in Ram (1982) or by deriving the weights from the relative frequencies of each indicators, as in Cerioli and Zani (1990) or Betti *et al*. (2008). In this paper, we follow Betti *et al*. and define the weights assigned to each dimension k of CaS as a combination of two sets of weights, p_k^1 and p_k^2 such as $p_k = p_k^1 \times p_k^2$ (5)

Where the set of weights p_k^1 reflects the distribution of indicator k among the Parisian municipalities, measured by its variation coefficient. The set of weights p_k^2 gives information on the correlation of each dimension k with CaS' two other dimensions. It is defined by:

$$p_k^2 \propto \left(\frac{1}{1+\sum_{k'=1} \rho_{k,k'} \left| \rho_{k,k'} < \rho_H}\right) . \left(\frac{1}{\sum_{k'=1} \rho_{k,k'} \left| \rho_{k,k'} \geq \rho_H}\right)\right. \quad (6)$$

where $\rho_{k,k'}$is the correlation coefficient between dimensions k and k', and where ρ_H is a threshold allowing to discriminate between a weak and strong correlation between the dimensions. As in Betti *et al*., we have chosen $\rho_H = 0.5$. After normalization (so that $\sum p_k = 1$), the resulting weights are presented in table 4.

Table 4. Weights affected to CaS' three dimensions

		Rel	Cap	Cho
1999	p_k	0.1774	0.5191	0.3035
	p_k^1	0.1229	0.3178	0.2007
	p_k^2	0.7562	0.8557	0.7921
2006	p_k	0.3112	0.3320	0.3568
	p_k^1	0.1403	0.1566	0.1760
	p_k^2	0.7754	0.7408	0.7088

4. Well-being disparities in 2006: extremes matter

The question of a mutual reinforcement of social and spatial disparities has become a major issue in the French public opinion. In this section, we provide some empirical evidence on the reality of socio-spatial disparities in the Paris region in 2006. In particular, we discuss the issue of whether CaS and its dimensions are randomly distributed within the Paris territory or if there are clusters of very wealthy or very poor municipalities.

4.1. Looking beyond the a-spatial homogeneity of CaS levels

First, the CaS levels of the Paris region municipalities and Inner Paris neighborhoods may seem quite homogeneous (see table 5), i.e. very concentrated around the median.

Table 5. Descriptive statistics for CaS and its dimensions

	1999				**2006**			
	CaS	**Rel**	**Cap**	**Cho**	**CaS**	**Rel**	**Cap**	**Cho**
Min	0	0	0	0	0	0	0	0
1st quartile	49.75	38.46	23.01	87.00	54.27	34.56	34.56	85.89
Median	55.89	85.33	43.38	85.72	59.00	45.88	48.25	85.33
Mean	55.54	44.42	28.31	92.29	61.84	47.34	44.64	97.72
3rd quartile	64.98	49.39	78.50	95.57	68.10	52.43	60.94	95.15
Max	100	100	100	100	100	100	100	100

How to read the table

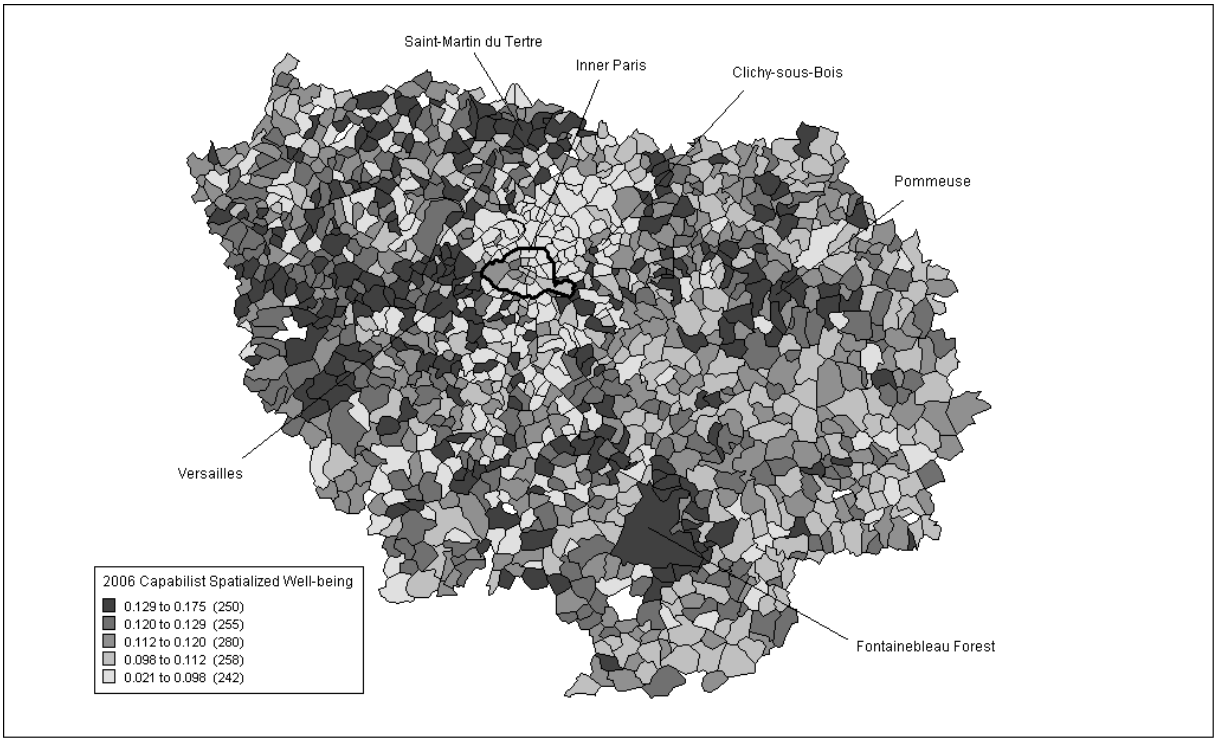
We have linearized CaS and its dimensions (Cap, Cho and Rel), so that the CaS level of the most disadvantaged municipality is equal to 0; that of the most advantaged, 100; and those of the other municipalities are expressed as a percentage of the difference between these two thresholds.

Example: in 1999, a quarter of the Parisian municipalities have a Cas level inferior or equal to 49.75% of the CaS level of the of the wealthiest municipality.

If the Paris region seems to harbor little well-being disparities form such an a-spatial point of view, the picture is very different when we take into account the spatial distribution of CaS within the Paris region (see Map 1).

As was already depicted by other empirical studies on the Paris region (Sagot, 2007), East/West and center/periphery contrasts are notable. CaS levels are much higher in the West than in the East and in the center than in the periphery. Beyond this general structure, some zones stand out from the rest of the Paris region municipalities. As far as the wealthy municipalities are concerned, we observe a large and very advantaged zone west of Paris (around Versailles and along the valley of Chevreuse) and a smaller very advantaged zone to the South (around the forest of Fontainebleau). We can also note an archipelago of advantaged municipalities to the East along the Marne river. By contrast, even if very poor municipalities (i.e., those with CaS levels under 30% of the maximum level) are very few in number (about only 10% of the total of municipalities), they seem to be almost exclusively clustered in the closest northern *banlieue* of Inner Paris. We also notice a large crescent of rural municipalities with rather low levels of CaS that spread to the East and South ends of the Paris region.

Figure 2. Spatialized Capabilist Well-being in 2006



Another interesting stylized fact is the pivotal role played by Paris in this geography. Inner Paris is split by the dividing line that separates advantaged zones from disadvantaged zones. Such a reality is striking because downtown Paris is not only the geographical and political center of the region but also a social crossroads where the most blatant well-being fractures take place.

The Moran spatial auto-correlation test confirms this picture of a clearly socio-spatially differentiated Paris region in 2006. Because Moran's I coefficient is significantly positive (see table 6), we can state that in Paris, the socioeconomic distance between advantaged and disadvantaged municipalities is combined with their geographical distance.

Table 6. Moran's coefficients in 1999 and 2006

	Moran's I
1999	0.1263 (1%)
2006	0.2105 (1%)

Moran's auto-correlation test confirms the existence of a real socio-spatial fracture in the Paris region. To get a more in-depth view of the geography and clustering of the Paris region's well-being disparities, we focus on the spatial association of the CaS levels.

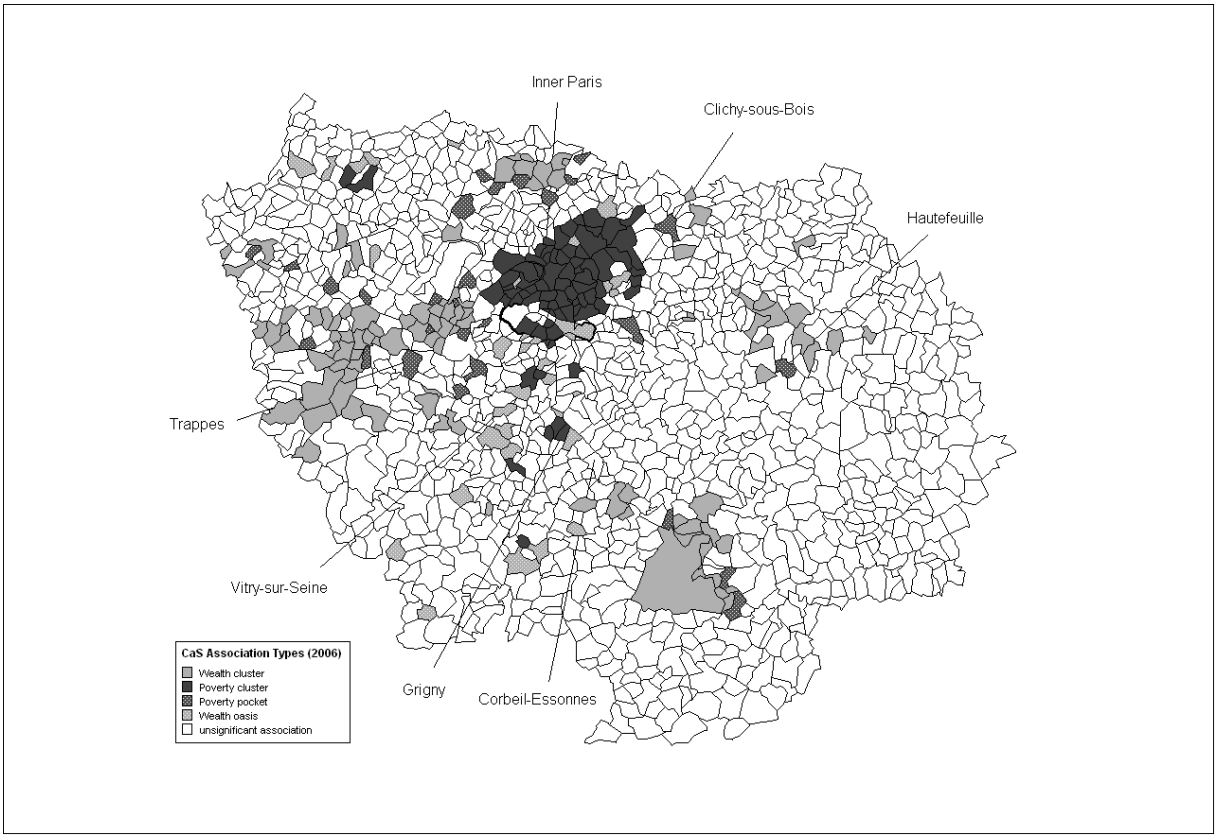
4.2. A blatant clustering of the very rich and the very poor

In the previous section, we have underlined the socio-spatial disparities in the Paris region. It remains to be seen whether this fracture is displayed across the whole Paris region, or if it only concerns certain specific areas of the Paris region. To study the clustering of the municipalities by CaS levels[8i], we rely on Anselin's LISA statistic (Anselin, 1995). Five types of spatial association can be identified (see Fig. 3):

- Poverty clusters where significantly disadvantaged municipalities are surrounded by similarly significantly disadvantaged municipalities (in dark gray);
- Wealth clusters where significantly advantaged municipalities are similarly surrounded by significantly advantaged municipalities (in light gray);
- Poverty pockets where significantly disadvantaged municipalities are surrounded, by contrast, by significantly advantaged municipalities (in striped dark gray);
- Wealth havens where significantly advantaged municipalities are surrounded, by contrast, by significantly disadvantaged municipalities (in striped light gray);
- Others: spatial association is statistically unsignificant at 10% (in white).

Figure 3. Local Capabilist Spatialized Well-being association types (2006)

[8] The calculations presented in this section have been carried out with the help of the spatial-data-analysis software package GeoDa (Anselin, Syabri and Kho, 2006), which is available free of charge for non-commercial usage at https//geoda.uiuc.edu. Moran's I can be interpreted as the ratio of the covariance between observations contiguous to the total observed variance of the sample. The interpretation of the Moran index rests on the comparison of the value I with its expected value $] = -(n-1)^{-1}$ (here $] \approx -0.0080$) under the null hypothesis of absence of spatial auto-correlation. If $E[I]$ (resp. $E[I]$), the CaS levels are not located randomly in the Paris region space, but are close for any two neighboring (distant) municipalities: there is a positive (negative) spatial auto-correlation of CaS levels. If is significantly close to $]$, we conclude that there is no patial auto-correlation: no significant relationship can be established between the statistical and geographical proximities of the Paris region municipalities.



For a large majority of the Paris region municipalities, no significant spatial association can be observed (municipalities in white on Fig. 3): most of the Paris region territory consists in large zones of contiguous municipalities whose populations' levels of well-being are neither significantly different from those of their neighbors nor from the Paris region average. Hence the socio-spatial differentiation identified in the previous section does not mean a full hierarchical sorting out of the Paris region territory by well-being levels.

By contrast, clustering occurs at both extremes of the well-being hierarchy. Very advantaged populations are clustered in two zones: the area around Fontainebleau in the South and a large zone around Versailles to the extreme West of the region. The cluster of disadvantaged municipalities is unique but spreads over a very large zone. It is interesting to note that this poor cluster encroaches on a large part of the inner city, and includes many central district neighborhoods of Inner Paris.

A striking feature is the geographical proximity of the poor and rich clusters, at the very edge of Inner Paris: the socio-spatial fracture cuts across the deepest heart of the Paris region, which in our eyes explains public opinion's acute awareness of the well-being disparities that threaten both social cohesion and the Republican Pact.

5. Well-being evolution, 1999-2006 : the poorest matter

In this section, we investigate whether there is empirical evidence supporting the widespread perception of a dramatic *intensification* of the Paris region socio-spatial differentiation. Can we really observe a “generalized secession” of the wealthiest Parisian municipalities (Maurin, 2004)? If this hypothesis were confirmed, it would mean that spatial disparities in terms of CaS well-being are increasingly affecting the whole region. Our results do not support this hypothesis. However, keen local issues must be underlined.

5.1. Social catching up vs. socio-spatial divergence

First, we measure the correlation between the CaS levels in 1999 and their relative evolution between 1999 and 2006. We fing that the Spearman rank correlation coefficient is equal to -0.694 (at a 1% significativity level), which means that, on average, the lower the CaS level in 1999, the more favorable its relative evolution between the two censuses. From a non-spatial point of view, this points to a global "catching-up" of Cas levels between rich and poor municipalities and a loosening of the well-being disparities within the Paris region.

Does this mean that the socio-spatial fracture identified in section 4.1. for the year 2006 is the result of a positive evolution between 1999 and 2006? This would be the case if spatial auto-correlation of CaS levels had gone down over this period. On the contrary, when comparing Moran' I for 1999 and 2006 (see table 3), we find that spatial auto-correlation of well-being levels has significatively increased. This means that municipalities with similar CaS levels tend to be geographically closer to one another in 2006 than in 1999, and that the socio-spatial fracture of the Paris region has deepened, not shrunken.

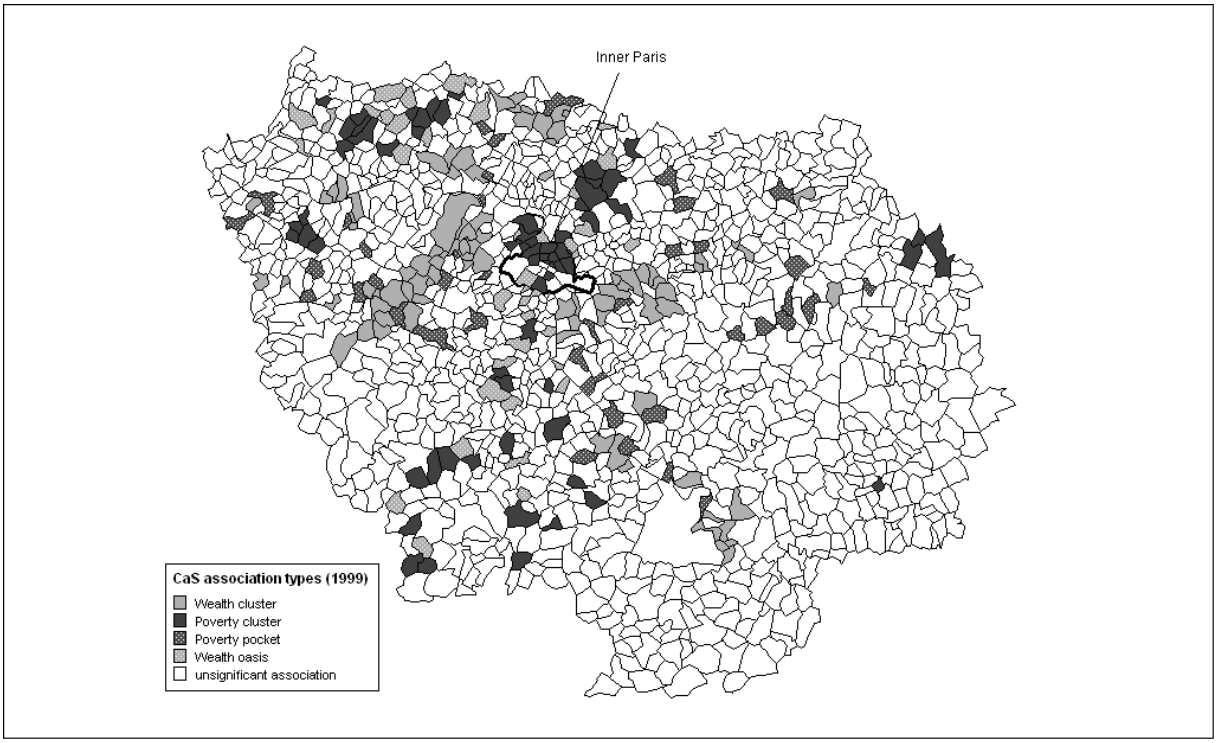
What does that imply for the "extreme" zones (very advantaged or very disadvantaged) identified in 2006, and that were a prominent aspect of the region's well-being geography? This is what we explore in the following section.

5.2. Less CaS clusters but wider and closer ones

The relative lack of differentiation of the Paris region territory in terms of CaS levels proves to be a permanent feature of the 1999-2006 period. In 1999, as in 2006, most municipalities and central district neighborhoods were neither wealth havens (in stripped light gray) nor poverty pockets (in stripped dark gray), poverty clusters (in dark gray) or wealth

clusters (in light gray) (see Fig. 4). However, as in Section 4., interesting evidence can be drawn about the extremes ends of the CaS hierarchy, where most of the changes between 1999 and 2006 occurred.

Figure 4. Local Capabilist Spatialized Well-being association types (1999)



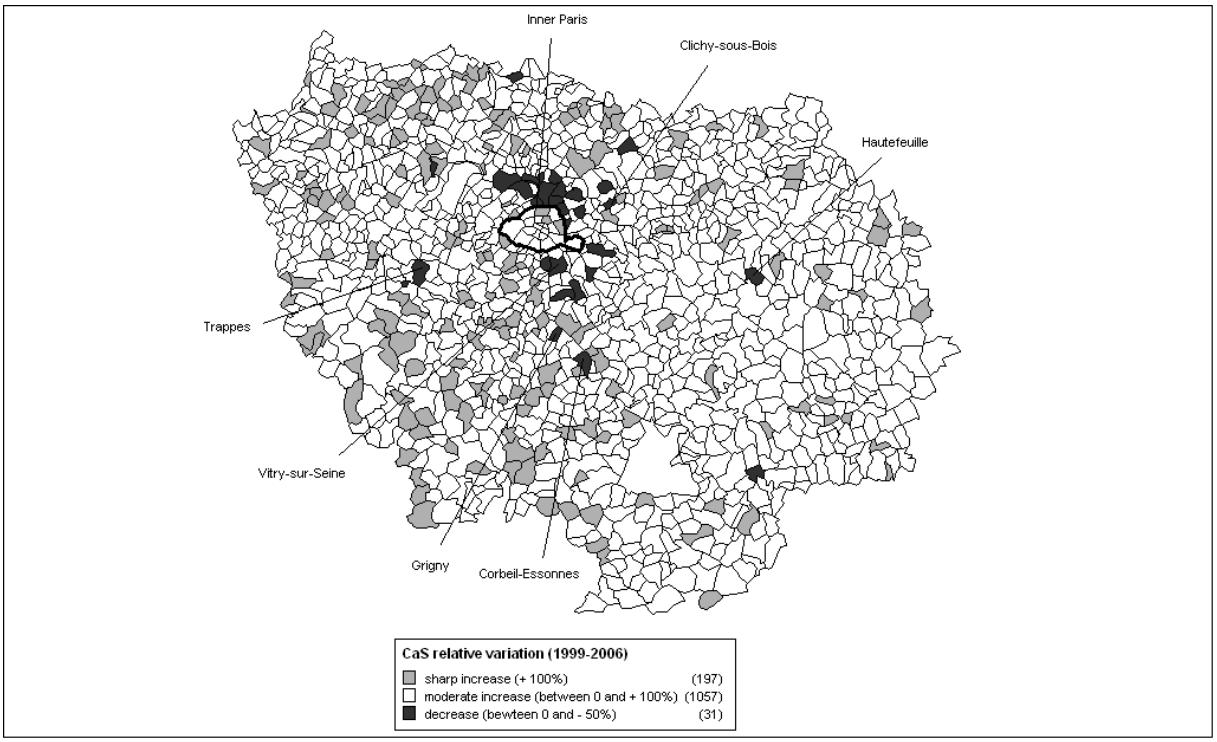
While the rich cluster's size and position in the Paris region did not undergo notable changes between 1999 and 2006, the large poor cluster identified in 2006 was only in the making in 1999, where two rather small very disadvantaged zones could be identified. One was centered on Inner Paris' northern central district neighborhoods and the other in the North around Airport Charles-de-Gaulle. Between the two censuses, these two zones merged and, by doing so, included all the municipalities that were between them in 1999. As a result, the distance between the statistically very advantaged and the statistically very disadvantaged municipalities dramatically shrunk between the two censuses. The increasing socio-spatial fracture observed in Section 5.1. therefore comes with a substantial reinforcement of the pre-existing spatial polarities that specifically stem from the lowest end of the CaS hierarchy.

5.3. A handful of municipalities seem to be drifting away

When one focuses not on the CaS levels in 1999 or 2006, but on their relative evolution between 1999 and 2006. see Map 4), it is striking to observe that some municipalities actually

suffered a *decrease* of their CaS levels between 199 and 2006 (in dark grey on Fig. 5) and that their perimeter roughly fits to one of the poverty clusters that were already visible in 1999. This downward evolution means that these municipalities were left behind during the global "catching-up" phenomenon highlighted in section 4. Although we are reluctant to use the term "ghetto" to characterize this zone – since our study provides no information on the specific cultures that prevail in this zone – we must nonetheless acknowledge the existence of, a the very heart of the Paris region, an enclave that seems to be drifting away from the region's rather positive shared destiny.

Figure 5. CaS levels relative variation between 1999 and 2006



6. Conclusion

In this paper, our objectives were twofold. First, we wanted to shed some light on whether the collective perception of a dramatic increase of the Paris region's socio-spatial disparities during the decade preceding the 2005 riots was grounded on fact or not. Second, we wanted to highlight the necessity to explicitly take space into account when defining and measuring urban well-being. Such a methodological stance led us to advocate for a multidimensional Capabilist and explicitly Spatialized well-being indicator (CaS), for which we proposed a first specification for the municipalities and central district neighborhoods of the Paris Region in 1999 and 2006.

Using standard ESDA techniques, we showed that there is no evidence of a generalized social differentiation in the Paris region between 1999 and 2006. On the contrary, we recorded not only an increase of the CaS aggregated at the region level between 1999 and 2006 but also, on average, a catching-up phenomenon between the CaS levels of the disfavored and the favored municipalities.

However, when departing from such an a-spatial point of view and actually focusing on the spatial distribution of the municipalities CaS levels within the Paris region, we uncovered, both in 1999 and in 2006, a significant clustering of the extremely CaS-favored and the extremely CaS-disfavored municipalities. Moreover, we revealed that the 1999 clusters of very disadvantaged municipalities widened between the two censuses and, by doing so, covering in 2006 a fair share of the region and even encroaching on some of the Central District neighborhoods i.e. the cultural, political and social crossroads of the region. More worryingly, by contrast with the CaS levels global rise between 1999 and 2006, the few municipalities that actually suffered a *decrease* of their capabilist spatialized well-being were located in the cluster of the poorest ones in 1999. A handful of municipalities have therefore been dramatically excluded from the general improvement process, and this could indeed account for the pervasive collective perception that the region is threatened by dangerous centrifugal forces.

Such contrasting results fuel our initial postulate that *space matters* when assessing well-being disparities.

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i The calculations presented in this section have been carried out with the help of the spatial-data-analysis software package GeoDa (Anselin, Syabri and Kho, 2006), which is available free of charge for non-commercial usage at https//geoda.uiuc.edu. Moran's I can be interpreted as the ratio of the covariance between observations contiguous to the total observed variance of the sample. The interpretation of the Moran index rests on the comparison of the value I with its expected value $E[I] = -(n-1)^{-1}$ (here $E[I] \approx -0.0080$) under the null hypothesis of absence of spatial auto-correlation. If $I > E[I]$ (resp. $I < E[I]$), the CaS levels are not located randomly in the Paris region space, but are close for any two neighboring (distant) municipalities: there is a positive (negative) spatial auto-correlation of CaS levels. If is significantly close to $E[I]$, we conclude that there is no patial auto-correlation: no significant relationship can be established between the statistical and geographical proximities of the Paris region municipalities.