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DOES THE COMPOSITION OF CLASSES AFFECT SOCIAL AND EDUCATIONAL DIVERSITY? "PASSIVE" AND "ACTIVE" SEGREGATION IN MIDDLE AND HIGH SCHOOLS IN THE PARIS REGION

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Summary

The marked economic and social differences characteristic of the Paris region are reflected in marked intra-regional academic inequalities. These inequalities, created mostly by factors outside the education system, greatly constrain the capacities of school principals to improve social and academic diversity in their schools.
This IPP Note shows that on top of the structural constraints, schools themselves limit even further the social and academic mix within their own walls by their ways of composing classes, which reinforce students' local experiences of segregation. This influence is highly significant: **within a municipality, segregation among classes in a middle school or high school is comparable to the segregation seen among different schools in the area**.
Equally surprisingly perhaps, **chance explains the largest portion of internal segregation**: 84 per cent of social disparities and 72 per cent of academic differences among classes in the same establishment arise from the random element in the constitution of classes. Because chance does not "naturally" create diversity, **greater attention by school heads to the academic and social balance of their classes would help to reduce significantly the levels of segregation**.
It should be noted, however, that beyond this "passive" segregation, from **15 to 20 per cent of schools engage in "active" segregation by grouping students according to their stream and subject choices**. This is particularly evident in the municipalities and counties that are richer than average, and **where public schools compete with private schools**.

- On average in the Paris region, a high-SES student has 13 high-SES students in their class while a low-SES or middle-SES student only has 6 such students in their class. Within each municipality, segregation among classes in the same school accounts for one-third of the total segregation among all classes in all the schools of the municipality.
- Between 70 and 85 per cent of segregation among classes is explained simply by the role of chance in the constitution of those classes. The segregation that is caused by factors other than chance arises in large part from grouping students together in line with their subject choices. This is particularly clear in the public schools that are the most exposed to competition from the private sector.

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The role of regional inequalities and stream choices

The Paris region is highly heterogeneous, in economic and social terms as much as academic ones. According to the *Insee* census data, the median annual income gap between the richest and poorest ten per cent of its municipalities was close to one thousand euros per month in 2011. In absolute value terms, the gap in results of the national brevet between *départements* was up to 13 points in 2011.

Since this socio-spatial segregation occurs in all parts of the region, it is automatically reproduced in the region's schools, which take in students who are highly differentiated in social and academic terms. It also thus limits considerably the degree to which the youth of the region are brought into daily contact with their contemporaries with social backgrounds and academic abilities different from their own.

Beyond these regional inequalities, the students' stream choices, strongly linked to social origins and academic abilities, have the effect of separating students of different backgrounds even further. Hence, while 54 per cent of the Paris region's pupils in the general stream come from an affluent backgroun d, only 23 per cent of pupils in the 3-year vocational stream are of that background. Regarding success at the brevet, if we rank the students between 0 (the best) and 100 (the lowest) within their academy, students who attend the general stream in the first year of high school rank 41st on average, while vocational-stream students' rank 81st on average. A substantial level of social and academic segregation.

A large-scale social and educational segregation

Data collected by the statistical services of the *académies* of Créteil, Paris and Versailles, and by the ministry of education, show the total distribution of secondary education students between 2002 and 2012. We used these data to create indices of social and academic segregation, the interpretation of which is explained in the following example. In 2012, in middle school, the proportion of high-SES students was 33 per cent.

The average middle school student was in a class comprising 33 per cent high-SES students (about eight in a 25-student class). However, a middle school student who was herself or himself high-SES was in a class with 52 per cent of high-SES students (13 pupils), while a non-high-SES (low-SES or middle class) middle school student was in a class with only 23 per cent of high-SES students (6 pupils).
On average, a high-SES student therefore had seven more high-SES students in her or his class than a non-high-SES student.

The difference between these two rates (52% - 23% = 29%) defines the value of our index of social segregation (see Box). In high school, the social segregation indicator is slightly higher: 30 per cent in the first year, 33 per cent in the second year and 31 per cent in the final year.

Academic segregation is measured in a similar way. We were interested in the distribution of the 25 per cent of students with the best brevet exam results in their *académie*.
The academic segregation index was 22 per cent in the final year of middle school, 28 and 36 per cent in the first and second years of high school respectively, and 33 per cent in the final year. This unequal separation of pupils on the basis of their academic abilities is basically explained by the selective character of the tracking both between the vocational and general stream, and between the majors within those streams (e.g. in the general-stream high schools, among the natural science, social science and humanities majors).

Segregation in the area is not homogeneous. Thus, while social segregation is around 30 per cent in the académies of Paris and Versailles, it is "only" 23 per cent in Créteil. Degrees of academic differentiation, on the other hand, are very similar in the three académies: this surprising result is explained by the fact that the segregation occurs among classes and not among schools. Thus, while academic segregation among high schools is much higher in Paris than in Créteil and Versailles, **segregation among classes within the same high school restores the balance between the three *academies.***

Box: how do we measure segregation?

To measure segregation (social, for example), we used a segregation index, whose value lies between 0 and 100 per cent; its mathematical definition is as follows: Assume a population of N individuals, distributed in K geographic units (schools or classes, for example). We treat the population as comprised of two groups: a reference group (e.g. high-SES students, or the students who came in the top one-fourth of their academy in the *brevet* exams) and the rest of the population. We call p the reference group; p^k the portion of that group in the unit k; and N^k the size of that unit. The normalised exposure index, with which we measure segregation, is defined as follows:

$$S = \frac{1}{p(1-p)} \sum_{k=1}^{K} \frac{N_k}{N} (p_k - p)^2$$

We can show that S is equal to the difference between the average exposure of the reference group among the students of this group and other students. The segregation index has a value of 0 (zero) when each of the units containing the same proportion of reference group students (i.e. the share of high-SES students is the same in all schools or in all classes). It has a value of 100 per cent if each of the units contains either only reference group students or no students of that group. In that case, no class shows any mix and segregation is total.

Box: definitions

The French secondary education system consists of four years of *collège* (grades 6 to 9) and three years of *lycée* (grades 10 to 12). Throughout this paper, "middle school" refers to the *collège* and "high school" refers to the *lycée*.

At the end of middle school, students sit a national exam called the *brevet*, though passing this exam is not required in order to enter high school. There is no tracking in middle school. In high school, students choose between the general stream and the vocational stream (with 2-year and 3-year tracks available). General-stream students also choose a major for the last two years of high school.

France is divided into 27 administrative regions (including 5 overseas regions) which are themselves divided in counties called *départements*. There are 100 *départements* overall, including 5 overseas. The ministry of education uses a slightly different division with 30 local authorities called *académies* who match the administrative regions approximately. The Paris region consists of three *académies* (Créteil, Paris and Versailles) and 8 *départements*.

1. For an analysis of the contribution of streaming and allocation procedures to social and academic segregation in Île-de-France high schools, see IPP Note no. 11 "Can we increase the social and academic mix in the education system? The impact of allocation procedures on *lycée* students in the Paris region" by Gabrielle Fack and Julien Grenet.

ONE-THIRD OF ALL LOCAL SEGREGATION IS INTER-CLASS INEQUALITY

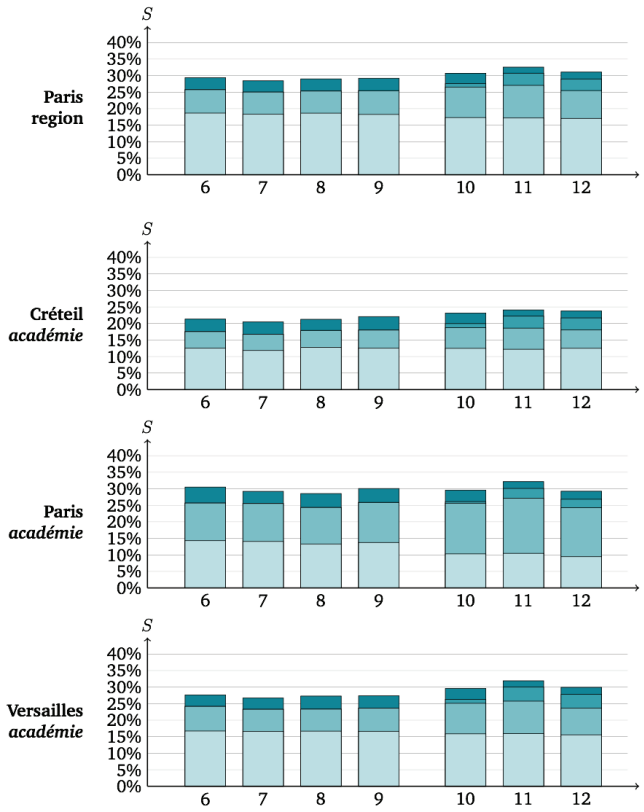
The values of segregation indices presented here are the result of several segregation phenomena. They are due in particular to the social disparities among the municipalities, which themselves explain between half and two-thirds of all social segregation, and between one-quarter and one-third of academic segregation.

In a context of significant social and academic inequalities on the geographic level, the flexibility that schools have to promote diversity within their own establishments would seem to be limited. However, at the municipal level, segregation among same-year classes (or among same-stream classes in high school) is comparable to the segregation among schools within the municipality.

More precisely, segregation among classes equals half of the segregation among schools, and therefore accounts for one-third of the total segregation. Put another way, when the students of a municipality are already unequally distributed among their local schools, their distribution into the classes within their middle or high school results in even greater segregation. In these conditions, if intra-school action on segregation does not result in a reduction of that part of segregation that arises from sub-regional inequalities, nevertheless, they can at least significantly reduce local imbalances.

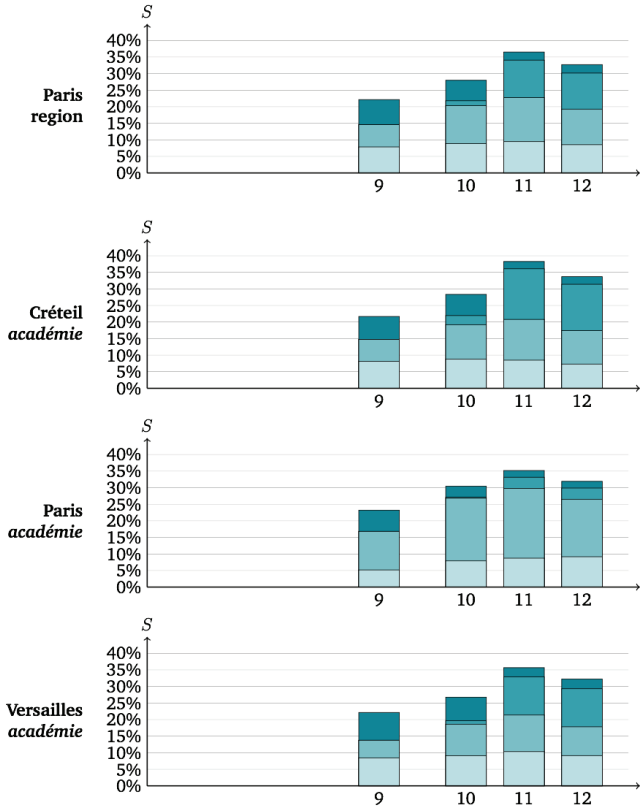
« Segregation among same-year classes (or among same-stream classes in high school) is comparable to the segregation among schools within the municipality »

Figure 1: Breakdown of social segregation in 2012, by academic level and academy



Sources: *Student registration records of the Paris region académies*
Note: In 2012, in the last year of middle school (9th grade) in the *académie* of Créteil, the difference between the percentage of high-SES classmates of a high-SES student and the percentage in the class of a non-high-SES student was 22 points. This difference is explained by the inequalities among municipalities within the academy (13 points), among middle schools within the municipalities (5 points) and among classes within the middle schools (4 points). The figures for high school are based on general-stream high schools only; the vocational stream is beyond the scope of this study.

Figure 2: Breakdown of academic segregation in 2010, by academic level and academy



Sources: *Student registration records and brevet scores of the Paris region academies*
Note: In 2010, in the last year of middle schools (9th grade) in the *académie* of Créteil, the difference between the proportion of "good students" (those who gained the top 25 per cent of brevet exam results in the academy) in the class of a good student and the proportion in the class of a weaker student was 22 points. This difference is explained by segregation among municipalities of the academy (8 points), among middle schools within the municipalities (7 points) and among classes within the middle schools (7 points). The figures for high school are based on general-stream high schools only; the vocational stream is beyond the scope of this study.

SEGREGATION AND CLASS COMPOSITION PRACTICES

The fact that segregation among classes in the same school is similar to the degree of segregation that prevails among schools in the same municipality is not necessarily explained by the desire of school heads to differentiate their classes socially and academically. As a comparison, we measured the level of segregation seen when classes are constituted by drawing lots. **In 84 per cent of the cases, the disparities among classes that result from chance are sufficient to explain the observed levels of social segregation**. In 72 per cent of the cases, they are also sufficient to explain academic segregation.

Indeed, we must keep in mind that the size of a class being around 25 to 30 pupils, only a few unfortunate draws are sufficient to create social and academic disparities among classes of the same magnitude as those that appear among schools. **Therefore, school heads have an opportunity to reduce substantially social and academic segregation, by paying particular attention to classroom balance.**

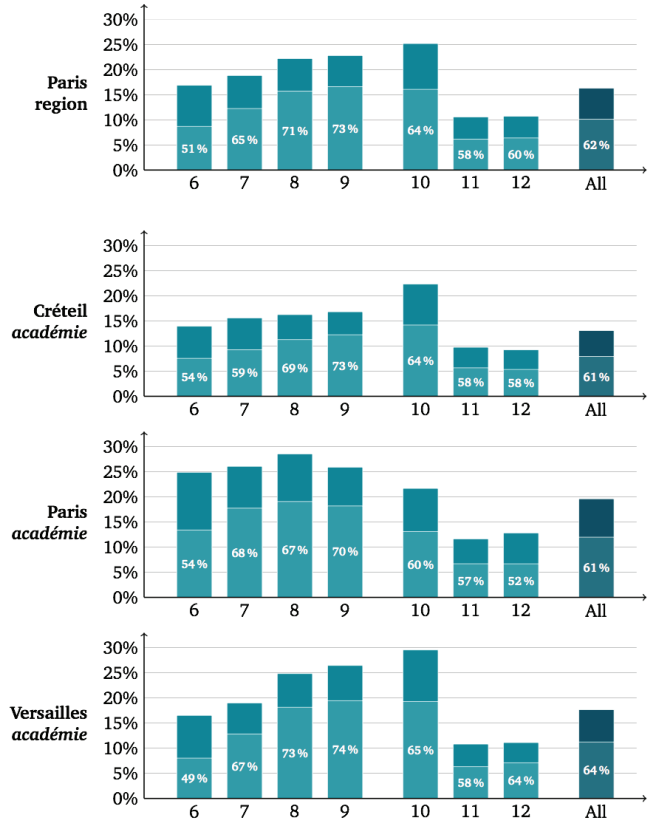
Beyond this "random" element of segregation, it is possible to show an "active" segregation in around 16 per cent of cohorts when we investigate academic segregation, and 28 per cent in the case of social segregation.

This rate varies considerably in the course of a pupil's school-life and corresponds to just the average of all years in middle school and general-stream high school. It is much weaker in the last two years of high school, where stream selection greatly reduces the incentives to resort to segregation among classes of the same stream. In contrast, "active" segregation increases continually between the first year of middle school and the first year of high school, as elective choices increase. It reaches its height in the first year of general-stream high school – many high schools seem to constitute their first-year classes based on their expectations about the second- and third-year majors that the students will opt for.

A second element of this "active" segregation is the grouping into the same classes of students who have chosen to study the same foreign languages or the same electives. Indeed, choices of electives are a strategy for getting into the "best" classes that is well known by students and parents. Electives are chosen mostly by students with good marks and from affluent families, and the grouping of these students therefore naturally results in social and academic segregation. Of the 16 per cent of social segregation (and 28 per cent of academic segregation) that is not explained by chance, 62 per cent (70 per cent in the latter case) are explained by the distribution of electives in the classes. If the schools did not constitute their classes on the basis of student choices, then two-thirds of "active" segregation would be avoided.

2. A "cohort" denotes a group of students entering the same school in the same year, at the same grade level (and in the same stream in the case of high school grade), and whom the principal must assign to a class.

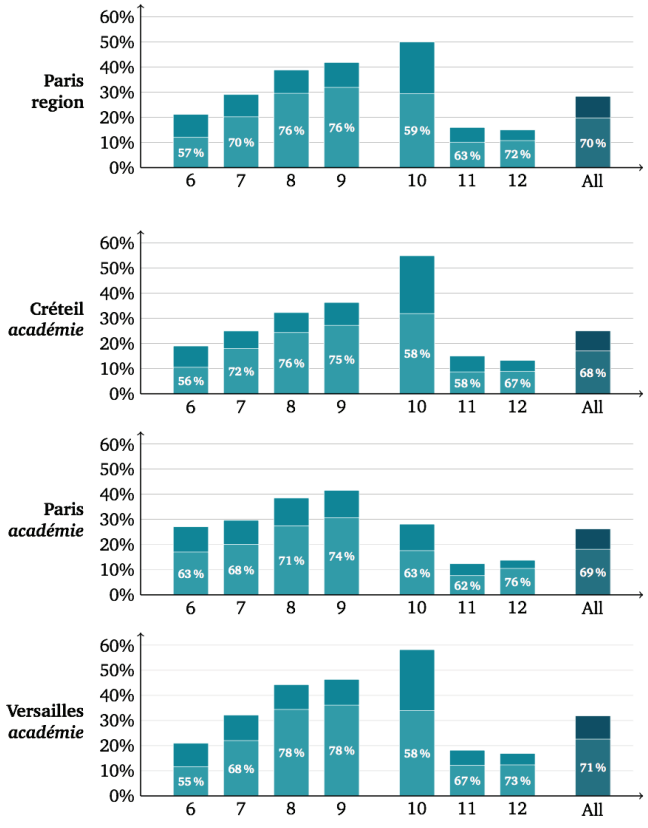
Figure 3: Portion of cohorts actively segregated socially in the period 2001-2012, by academic level and academy



Sources: Student registration records of the Paris region *académies*

Note: Note: Between 2002 and 2012, in the final year of middle school (9th grade) in the Paris academy, the degree of intra-school social segregation was too high to be explained by chance for 26 per cent of the cohorts. Of these 26 per cent of students who were "actively" segregated, 70 per cent of the segregation can be explained by the role of electives and 30 per cent by other factors. A "cohort" denotes a group of students entering the same school in the same year, at the same grade level (and in the same stream in the case of high school grade), and who the principal must assign to a class. The figures for high school are based on general-stream high schools only; the vocational stream is beyond

Figure 4: Portion of the cohorts "actively" segregated academically in the period 2002-2012, by academic level and by academy



Sources: Student registration records and brevet scores of the Paris region academies

Note: Between 2002 and 2012, in the last year of middle school (9th grade) in the Paris académie, the degree of intra-school academic segregation was too high to be explained by chance for 41 per cent of the cohorts. Of these 41 per cent of actively segregated students, 74 per cent of the segregation can be explained by the role of electives and 26 per cent by other factors. A "cohort" denotes a group of students entering the same school in the same year, at the same grade level (and in the same stream in the case of high school grade), and whom the principal must assign to a class. The figures for high school are based on general-stream high schools only; the vocational stream is beyond the scope of this study.

COMPETITION WITH THE PRIVATE SECTOR IS THE MAIN SOURCE OF INTRA-SCHOOL SEGREGATION

While chance accounts for a large portion of intra-school segregation, it is interesting to study the schools whose segregation is not explained by chance and thus seem to implement "active" segregation. We focused on the schools where this form of segregation is particularly high: they represent 21 per cent of middle schools and 13 per cent of high schools.

Schools with very high rates of "active" segregation are generally found in the richest municipalities with higher than average population density.

Above all, **this phenomenon is most present in the public schools that face stiff competition from the private sector**, i.e. schools that have a private school nearby. The proportion of students from socially advantaged backgrounds is highest in these schools, probably partly because intra-school segregation strategies are implemented in order to prevent a drain of such students towards the private schools.

Regarding geographic distribution, we note that "active segregation" is especially present in Paris and less common in Créteil. A more detailed area-based analysis indicates that active intra-school segregation is often seen in areas that are richer than the regional average.

Table 1: Characteristics of middle schools in terms of their frequency of social segregation

Segregates "often"...	No	Yes	Difference
2009 population density (h/km^2)	7,628	11,532	+3904*
2009 unemployment rate	11.3 %	10.2 %	−1.2*
2010 median income (k€ p.a.)	21.8	24.7	+2.8*
2010 income decile ratio	6.5	7.0	+0.5*
City elected a liberal mayor in 2008	53.3 %	42.2 %	−11.1*
Public school	77.1 %	90.6 %	+13.4*
Share of high-SES students	26.7 %	34.2 %	+7.5*
Private school nearby	38.8 %	57.5 %	+18.7*
# of schools	879	233	

Sources: Student registration records of the Paris region académies
Note: Asterisks in the "Difference" column indicate where the difference is statistically significant. Of the middle schools in which significant active segregation occurs significantly more often than the average rate (233 middle schools), 90.6 per cent are public schools, while of those in which it occurs less often (879), 77.1 per cent are public institutions. This difference of 13.4 per cent is statistically significant.

Table 2: Characteristics of high schools in terms of their frequency of social segregation

Segregates "often"...	No	Yes	Difference
2009 population density (h/km^2)	10,270	11,805	+1,535
2009 unemployment rate	11.3 %	9.9 %	−1.4*
2010 median income (k€ p.a.)	23.2	25.3	+2.1*
2010 income decile ratio	7.2	7.3	+0.0
City elected a liberal mayor in 2008	51.0 %	39.3 %	−11.8
Public school	68.3 %	86.9 %	+18.6*
Share of high-SES students	29.6 %	33.5 %	+3.8
Private school nearby	42.7 %	53.6 %	+10.9*
# of schools	586	84	

Sources: Student registration records of the Paris region académies
Note: Note: Asterisks in the "Difference" column indicate where the difference is statistically significant. Of the high schools in which a significant degree of active segregation occurs more often than the average rate (84 high schools), 86.9 per cent are public schools, while of those in which it occurs less often (586 high schools), only 68.3 per cent are public establishments. The difference of 18.6 points is statistically significant.

CONCLUSION

There is substantial academic and social segregation in middle and high schools in the Paris region. Adopting a rather broad definition of high-SES students (around one-third of the population), we note that **a high-SES child has on average twice as many high-SES classmates in her or his class as a child who is not from a high SES** (52 per cent compared with 23 per cent).

This scholarly cohabitation among children of affluent backgrounds is first a matter of geographic segregation, that is, of highly unequal distribution of well-off families across the municipalities and neighbourhoods of the region. But a non-negligible part of it also arises from the uneven distribution of such children among different classes within the same school. **On average, within a municipality, while around two-thirds of the segregation experienced by middle school students results from social and academic disparities among the different neighbourhoods of the municipality, more than one-third reflects the unequal social composition of classes within different neighbourhoods of the municipality, more than one-third reflects the unequal social composition of classes within the same schools in those different neighbourhoods.** Somewhat surprisingly**, the primary explanation for this segregation composed of differences among classes is chance**. Indeed, 84 per cent of social segregation and 72 per cent of academic segregation appears naturally if the classes are constituted in a random fashion. The rest is explained essentially by the game of electives, which places students in different classes on the basis of their academic abilities and their social origins. **The principals of these schools could, therefore, by paying particular attention to class balance, significantly reduce social and academic segregation**.

Some schools, on the other hand, regularly perform a kind of "active" segregation above and beyond what is explained by the element of chance: 21 per cent of middle schools and 13 per cent of high schools do this. **This phenomenon occurs mostly in public schools situated in close proximity to a private school**. It is seen most often in the richest counties of the region.

References
This Note is based on analyses presented in the Rapport IPP June 2014: "La mixité sociale et scolaire en Île-de-France : le role des établissements " (in French). Directed by Son Thierry Ly, Éric Maurin and Arnaud Riegert, the report can be consulted on line at www.ipp.eu

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