
Louis Chauvel
Observatoire Français des Conjonctures Economiques
Observatoire Sociologique du Changement
Institut d'Etudes Politiques de Paris
Fondation Nationale des Sciences Politiques
69, Quai d'Orsay
75007 Paris
fax: 33.1.44.18.54.54.
E-mail: chauvel@ofce.sciences-po.fr

Education and Class Membership Fluctuations by Cohorts in France and United-States (1960-2000)^(*)

Abstract

This paper is an assessment of the impact of educational and of labour market fluctuations on cohorts born between 1905 & 1975 in United-States and France. Even if the pace and the rhythm is not exactly the same, these two countries are characterised by substantial cohort fluctuations. There have been important oscillations of the access probabilities to longer education and to the highest social positions (for example in terms of access rates to EGP class I or I + II). Because these two factors do not fluctuate in parallel way, the "absolute social value" of education (the probabilities of access to highest social classes for a given level of education) could know important variations.

Non-linear expansions of educational opportunities occurred both in France and in United-States. A first educational boom benefited most to the first cohorts of the baby-boom (birth: 1945-1950), later baby-boom cohorts (1950-1965) had been submitted to a relative (in France) or absolute (in United-States) educational decay, and baby-bust cohorts (1970-1975) have known a second wave of expansion.

The labour market capacity of absorption of these cohorts during their transition from school to work principally depended on economic growth. First jobs and early labour experiences had a strategic role in the status attainment process of these cohorts, and for the subsequent steps of their trajectory in the social stratification system.

We assess (1) educational changes, (2) social structure mutations, and (3) the link between education and social position of each cohort, with age-period-cohort models, and with a new modified age-period-cohort model including a "catch-up effect" (effect of recovery of early handicaps). In this paper, we assess these evolutions for the male population; further research will underline the gender difference and the history of feminisation of higher social positions. Four different large size samples (N between 300 thousands to 1.2 million) of the male population have been constructed. For United-States, a 1960-2000 census extract (0.1%) and Current populations surveys cumulative file, and for France a compilation (1964-2000) of FQP and Labour force surveys).

^(*) I should thank first Mike Hout and his team at the Survey Research Center (University of California at Berkeley). Mike had kindly invited me for one month in his institution where he offered comfortable means. Jon Stiles (UC data) oriented me in the archives and offered his help for different large samples manipulations. My stay in Berkeley has been supported by the French-Berkeley Fund (CNRS and UCB) and by the *Direction Scientifique* of Sciences-Po Paris. That paper is a part of a larger research on cohorts and life cycle recompositions of work, which is supported by the French *Ministère de la recherche*.

The aim of this paper is to show the statistical significance and the historico-sociological importance of birth cohort¹ fluctuations for the analysis of the social stratification dynamics in France and in United-States. These cohort-fluctuations result from the succession of economic cycles and from stop-and-go policies in investments for human capital and educational expansion. Even if I consider here exclusively the male population, this paper is a fragment of a larger project comparing male and female destiny. This paper is thus very complementary with more classical analyses in terms of *within cohort* inequalities: here, the central aspect is to measure the importance of between cohort inequalities.

The first step is to analyse the cohort trends of progress in educational attainment. In spite of our usual linear idea of progress, the French and United-States empirical situations show important fluctuations by cohorts. In both nations, the early baby-boom cohorts are at the top of a wave of educational progress; following cohorts are submitted to educational stagnation or even to decreasing level of education. The second step of this paper consists in the evolution of social stratification system in terms of occupational groups or social class (EGP style, see Erikson, Goldthorpe et Portocarero, 1979) by age, period and cohort in France and in United-States. The most singular and striking result is the dynamics of higher and lower service classes, which expanded from cohort 1909 through cohort 1950, and stagnates after. The third step is the analysis of correspondence between education and class. Two aspects of that correspondence exist. On the one hand we have the correspondence in terms of absolute rates of access to such or such social class by level of education; on the other in terms of relative competitive value of different degrees. If the second aspect seems to be more or less stable and specific to a given nation, the first one is much more complex.

Birth Cohorts, socialisation, and social history of welfare states

In a previous paper for the 1998 Montreal meeting of RC28 (Chauvel, 1998b), I have presented some results of my work on stratification dynamics by birth cohorts in France². The main factual results on France were:

- (1) When it is decomposed by birth cohort, the expansion of the level of education is not linear; the progress is clearly marked by rapid expansions followed by steps of stagnation;
- (2) Globally, when they are estimated by cohort, the rates of access to various social groups, notably those at the top of the social hierarchy, evolve by steps;
- (3) The 'social value' of a given level of education, measured by the probability of becoming a member of the highest social strata, is neither stable nor linearly growing from a cohort to the other.

¹ The cohorts I utilise here are exclusively birth cohorts. The data I present are repeated cross-section samples, and, thus, I consider pseudo-cohorts. The phrase « the 1967 cohort » qualifies those born in 1967 ; « the '60 cohorts », between 1960 and 1969; « the 1965-69 cohorts » those born between 1965 and 1969.

² A complete overview of my work on birth cohorts and social generations is in my book (in French): *Le destin des générations: structure sociale et cohortes en France au XX^e siècle* (Chauvel, 1998c).

Very synthetically, in France, the 1945-49 cohorts, the first cohorts of the baby-boom, have benefited from a boom in their social opportunities compared to those of the 1935 cohort: an expansion of 50 % of the probabilities of access to higher education. A similar growth of the opportunities to joint social groups corresponding to EGP service class I + II appears³. Thus, it might be useful, for stratification change research, to insist more on cohort analysis. When cohort analysis is avoided, the risk is to miss the rhythm, the pace and the timing of social change, and to forget the analysis of the social historical patterns of social change.

The central hypothesis of cohort analysis (Ryder, 1965) is that the period of primary socialisation, during youth, implies decisive experiences and situations that the new cohorts, individually and collectively, will have to go through and endure the consequences for their entire adult life. Thus, social history (I mean a complex evolution of private and public decisions of investment in education, of economic environment at the arrival of young cohorts in the labour force, of offer of skilled workers and of demand for skilled labour, etc.) could imply permanent scars. Consequently, the analysis of the social stratification system by birth cohort and the comparison of birth cohort destiny could reveal important cohort fluctuations, which are the long-term consequences of the fluctuations of social history shared by specific cohort groups.

That hypothesis is not new in the Anglo-Saxon context of the middle term of the twentieth century. Some classical empirical research works since World War II have presented the hypothesis that history implies sometimes non linearities on cohort's social destination and destiny. Glass and Hall (1954), for example, asked these questions. The succession of specific economic periods, the crisis and the emergence of public interventionism — for education, research, but also for health, social services, etc. — could have had an impact on the destiny of cohorts, and the authors tempted to illustrate that hypothesis. Nevertheless, the survey used by Glass, which was simply one cross-section sample, could not be sufficient to separate age and cohort effects. In the United-States, the comparison of life cycles and mobility by cohorts proposed by Jaffe and Carleton (1954, chap. 5) showed the specificity of cohorts born near the year 1910, arrived in the labour force during the thirties and who met a social destiny less favourable than successors and predecessors. Blau and Duncan (1967, pp. 81-113, 177-188) located similar effects for that 1929 generation, whose first five or ten years in the labour market were more difficult than for the elder and the younger, implying a comparative handicap which characterised them during their whole life.

In his social history of poverty, stratification and mobility in Boston⁴, Thernstrom (1973, pp.62-75) has found similar problems of shortened upward mobility for cohorts born near 1910. I insist on the hypothesis that the problem is not exclusively an economic issue: the 1929 crash and the depression of the thirties, which doomed the social destiny of the 1910 birth cohort, is not simply a problem in the “economic” sphere, endured by the young cohorts. The problem has two other aspects: public investment in education fluctuations and pro- or contra- cyclical policies of employment. The succession of periods of speed economic growth and of depressions certainly produce cohort fluctuations in the social stratification system, but stop and go policies in public investment in education causes also such fluctuations; accelerations and stalling of public employment produces

³ A fourth conclusion, in terms of gross social mobility rates (hierarchical flows of upward and downward mobility) showed that, even if social fluidity is more or less stable from a cohort to the other, the probabilities of upward or downward mobility differ considerably from a cohort to the other.

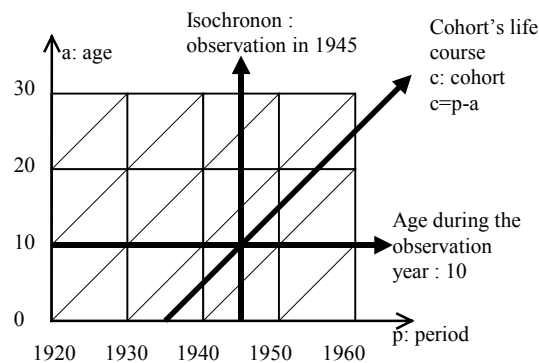
⁴ I thank Louis-Andre Vallet for point me the importance of this book.

similar effects. This paper is a step toward the assessment of that hypothesis, even if the comparison between France and United-States shows the complexity of the relation between education and class.

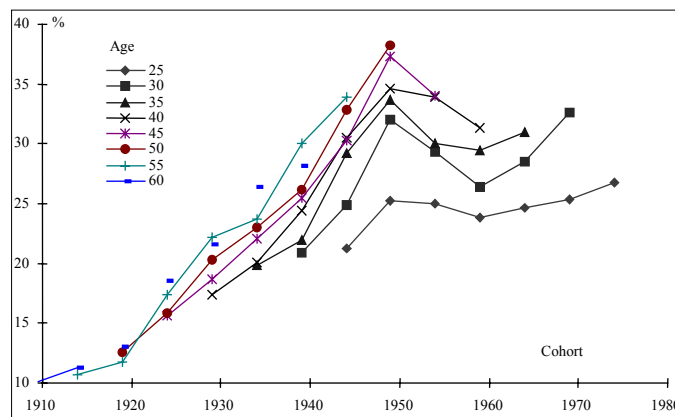
Methods

The basic instrument for cohort analysis is the Lexis diagram, which presents simultaneously the three chronological dimensions: period, age and cohort (diagram 1). It presents notably the perfect colinearity between the three dimensions, which is the source of many methodological difficulties, but further reflection on the detection of cohort fluctuations could offer a solution. Many methods of age-period-cohort analysis exist⁵. Some of them are graphical and others consist in model assessment.

1- Lexis-Becker-Verweij-Pressat diagram (Pressat style)



2- Bachelor's degree holders (or more) in the US male population (cohort diagram)



Source : US CPS 1968-1999 cumulative file ; male population; N=956 940.

In my Montreal paper (Chauvel, 1998b), I have presented some graphical methods, particularly the “cohort diagram” which presents, on the horizontal axis, the birth cohort, on the vertical one, a given indicator (ex. the percent of Bachelor's degree holders), and where each curve represent a given age

⁵ In (Chauvel, 1997 and 1998b), I have presented the most classical literature on APC models. A good recent presentation of the APC problems is : Wilmoth (forthcoming).

(diagram 2). If the curves at age 30, 35, 40, etc. presents parallel or similar shapes, and identical fractures revealing the same cleavages between the same cohorts at different ages, a cohort effect could be a correct hypothesis. Here, for the percent of Bachelor's degree (or more) holders in the male United-States population, we find:

- (1) an age effect (the curves for the elder are above those of younger) which signals the effect of further education;
- (2) a cohort fluctuation which reveals that the progression of education by cohort is not linear.

Here, from the 1909 cohort to 1949 cohort, the result of a steady growth of education appears. After, for following cohorts born after 1950, a rarefaction of BA degrees at any age is obvious. At age 30, 32% of the 1949 cohort holds a BA degree; for 1959 cohort, the proportion declines to 26% (-6 points). At later stage of the life cycle, the differential remains stable: at age 45, the percent of BA holders has grown; for early baby-boomer, 37,4% holds a BA degree, and 31,3% for 1959 cohort. The gap remains stable. The cohort diagram is may be the most convenient graphical representation of cohort effects for a descriptive research. Other 3-dimensional graphs could be interesting, but I shall refer to my book (Chauvel, 1998c, annex 2).

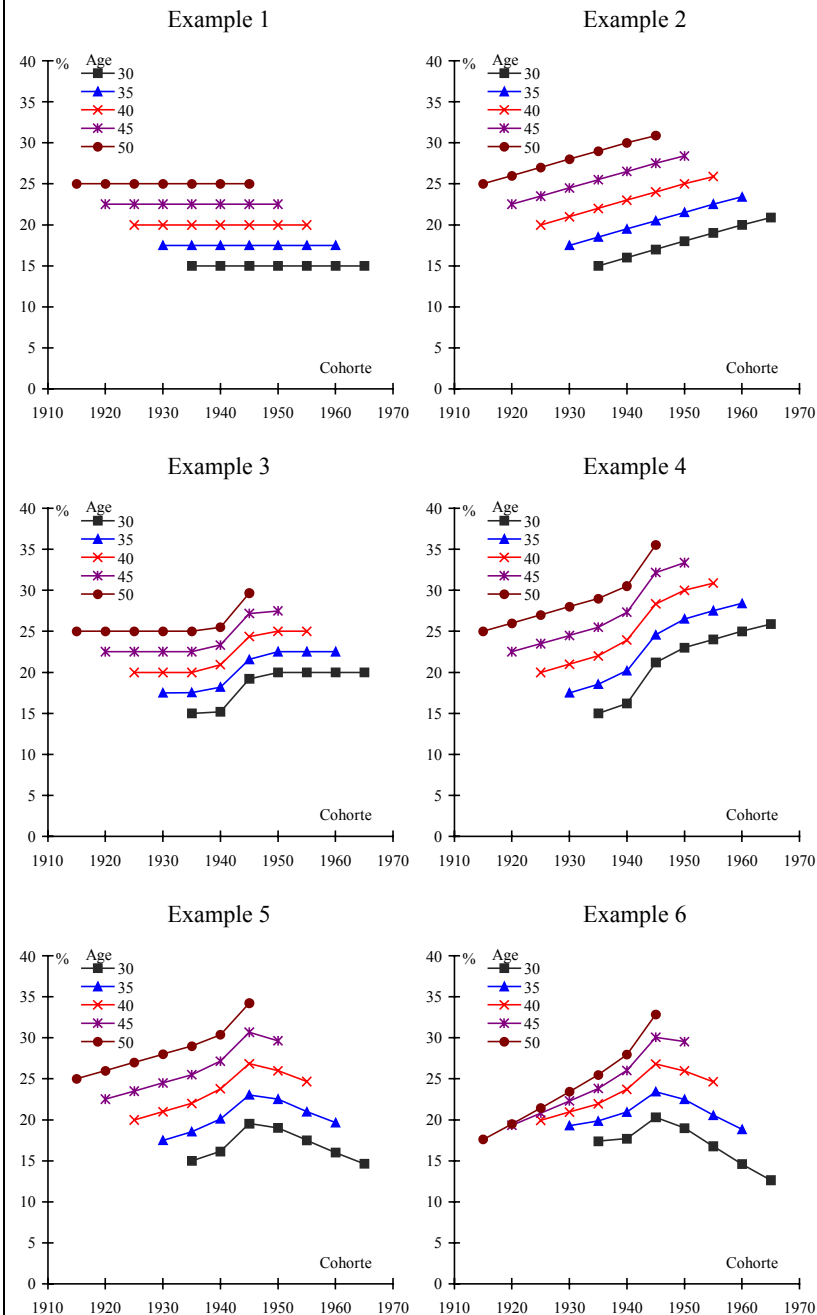
Cohort diagram: theoretical examples

The cohort diagram is the representation, for successive cohorts (horizontally), of the value of a given variable — percentages of housing property, suicide rates, income, or the proportion of EGP-I etc. — (vertically) at different ages materialised by the curves which follows the cohorts at the same age. On series of hypothetical examples, we may understand the logic of that diagram.

The first one (1) represents a society where the reproduction is perfect, with no collective progress: the successive cohorts knows the same position at the same age, identically, with the same age effect (15 % of EGP-I at 30 years old for the cohort born in 1935 as in 1965). Similarly, whatever the birth cohort, the proportion of EGP-I goes from 15 % at age 30 to 25 % at age 50. The second example (2) presents the case of a regular and linear trend of social progression, equally distributed by any cohort : from a previous cohort to the later, at the same age, the part of EGP-I is increasing ; for the 1935 cohort, 15 % of EGP-I at age 30 and 21 % for the 1965 cohort. Clearly, in a linear equally shared by cohort trend, any new cohort should experience a better destiny than the previous ones at the same age.

The third figure (3) reveals a very different pattern: the progress is, but it is entirely concentrated on one cohort: the 1945 cohort. It is a step progression. The cohorts born before know a first model of society with 20 % of EGP-I at age 40; those born after a second model, with 25 % at the same age. Evidently, the interpretation could be ambiguous: if the 1960 cohort benefited from the progress that the 1945 cohort initiated, the privilege of the 1945 cohort was to be the first to benefit from an higher proportion of EGP-I in a society where elders had a lower proportion of EGP-I. People born in 1960 have exactly the same position as their close elders at the same age. Here, a long-term social progress exists: with the replacement of old cohorts by new cohorts, the proportion of EGP-I increases. But that progress is not regularly distributed between cohorts. To be member of the 1945 cohort is the best, but for the 1940 cohort, the situation is distressing. For the 1960 cohort, clearly, it is not possible to understand, by one's personal experience, the signification of that social progress of which the elders of the 1945 cohort talk about.

The cohort diagram : six theoretical cases



The fourth figure (4) is a composition of the two previous situations: progressive growth, plus one step for the 1945 cohort. Here, the 1960 cohort continues to enjoy some progress, even if it is less spectacular than those of the 1945 cohort. The fifth case (5) is a situation of stopped growth and of contraction for the post-1945 cohorts. For the global mean, from the arrival in the labour market of the 1945 cohort to its maturity, the global mean proportion of EGP-I in the society will grow, but more and more slowly, and the fell down of the trend is inscribed in that cohort dynamic.

The sixth diagram (6) is inspired from the fifth, but is more complex: the ages deviate gradually from preceding cohort to the following one: the 1930 cohort seems homogenous, at least from age 35 to 50. The following cohorts know a progressive divergence: the life cycle is recomposing, and youth and maturity are less and less similar.

For a better assessment, notably in terms of statistical significance, many models have been proposed in the statistical and sociological literature. Since the Mason, Mason, Winsborough et Poole (1973) APC model, the problem of collinearity have produced a long discussion. Because $c = p - a$, a linear upward cohort effect formally corresponds to the combination of an upward period effect and of a downward age effect. In case of long term trend progress, any new cohort will benefit from better periods and, with age, any cohort will benefit from next (and thus better) periods during life course, and thus, a regular linear age-period-cohort intertemporal trend of progress can not be identified to any separate social time. Thus, no model could distinguish pure age, period and cohort effect *when a linear long-term trend is involved*. But when the effects are not linear (and are not another type of complex interaction between two chronological dimensions), the separation is possible. In fact, if we are interested only in cohort fluctuations, and not in long term linear progress, it is possible to introduce a new constraint in the original APC model to find an accurate solution. In other terms, we are interested here in the deviation of cohort effect from the long-term linear trend, and not in the linear trend itself (linear trend which constitutes the problem of multi-collinearity).

$$(1) \left\{ \begin{array}{l} \ln \left(\frac{x_{\alpha\pi\gamma}}{1-x_{\alpha\pi\gamma}} \right) = cst + a_{\alpha} + p_{\pi} + c_{\gamma} \\ \sum_{\alpha} a_{\alpha} = \sum_{\gamma} c_{\gamma} = \sum_{\pi} p_{\pi} = 0 \\ \sum_{\gamma} (\gamma - (\alpha_{\omega} / 2 - 1)) c_{\gamma} = 0, \text{ if } \alpha_{\omega}, \text{ the number of cohort groups, is an even number} \\ \sum_{\gamma} (\gamma - ((\alpha_{\omega} - 1) / 2 - 1)) c_{\gamma} = 0, \text{ if } \alpha_{\omega}, \text{ the number of cohort groups, is an uneven number} \end{array} \right.$$

Consider $x_{\alpha\pi\gamma}$ a given proportion, measured for ages α , periods π and cohorts γ ; we want to separate age, period and cohort effects. We can express the logit of x as a classical categorical APC model. The three first constraints assign to zero the sum of coefficients of each variable; the last two lines assign the coefficients pertaining to cohort to a zero trend curve. With that constraint, the problem of colinearity is diverted: the one aspect revealed by the coefficients pertaining to cohort groups consists in the deviation from the intertemporal intergenerational trend of growth. If cohort fluctuations significantly exist, the pertaining coefficients will significantly diverge from zero.

A central question is constantly addressed to APC models, and to cohort effects in general: if a cohort fluctuation is discovered, is it a permanent one, embracing the whole life of the cohorts, or a transitory one? In other terms, do cohorts suffering from a less favourable beginning catch up with the others or not? Are early handicaps followed by recovery? I propose a model for the assessment of such recovery effects.

$$(2) \left\{ \begin{array}{l} \ln \left(\frac{x_{\alpha\pi\gamma}}{1-x_{\alpha\pi\gamma}} \right) = cst + a_{\alpha} + p_{\pi} + \left(1 - \left(\frac{\alpha-1}{\alpha_{\omega}-1} \right) r \right) c_{\gamma} \\ \text{\{same constraints as (1)} \end{array} \right.$$

That model results from the previous one by adding a coefficient, r , pertaining to recovery effects. If $r=0$, we have a standard APC model; if $r=1$, a decrease at the beginning of life ($\alpha=1$) for a given cohort will progressively diminish and disappear completely at final age ($\alpha=\alpha_{\omega}$). For $r=2$, the early handicap will be followed by even better positions after the midterm of life. We can imagine examples with even greater r . But r could be negative, also, if early handicaps greaten during life course. In further models, we will consider social and educational position of male population from age 30 to age 59, thus, $\alpha=1$ refer to the 30-34 age group, $\alpha_{\omega}=6$ to people at age 55 to 59.

Data

Four great files have been constructed: two for United States and two for France. For these files, the strategy is the same. For both countries, we construct a longer-term file with a smaller sample for description purposes and a heavier sample on a shorter term for models. In any case, we need long term (some decades) cumulative files of cross-sectional samples containing 5 main variables: year=p, age=a, sex=s, actual education=e and social class=k (occupation). Cohort=c is p-a. An almost perfect continuity in the coding scheme is required; that constraint could be difficult to fulfil for education and class.

The United States files

The first file (US1) is a compilation of 0.1% United States Censuses 1950 to 1990 (Ruggles et al., 1997) completed by the 2000 Current population survey (source: BLS site: <http://ferret.bls.census.gov/>). It is a decennial pace file. The size of the extract containing men between age 20 and 64 is n= 279.731.

The second one (US2) is a 1968-1999 United States Current population survey. There is no intersection with the previous file. The size of the extract containing men between age 20 and 64 is n= 1.285.367. It is an annual file. I have added to the “Robert Mare and Christopher Winship extract file (1968-1992)” stored at NBER site (http://www.nber.org/data/mare_winship.html) the corresponding variables of the 1993-1999 Current Population surveys from the BLS site.

Both file present the same original codes concerning education (2 digits) and occupation (3 digits). Both variables ask problems of recoding continuity. First, the coding of education, which have been the same for four decades, have changed in Census-1990 (and CPS-1992). See Mare (1995), for a complete overview. The use of annual CPS surveys shows that a common code is easy to find and satisfying: the continuity of annual series provides a good test. The second question is more difficult. The occupation codes are revised for any new census, and imputed some years later in the CPS. The major groups proposed by the Census Bureau (which is *a priori* presumably more or less continuous from a census to the other) conduct in fact to unsatisfying results; the 2-digits occupation codes are also very misleading⁶. The only solution is to go back to the 3-digits codes (present in the Mare-Winship extract), that I have recoded in a 1950-Census-style Occupational code, that I have recoded in 11 classes (EGP scheme). I have applied generally the same choices than Ganzeboom and Nieuwbeerta (1996). When these choices are imputed to the annual CPS file, the data shows no important step for the years of discontinuity in original codes. Some other problems have been solved, such as discrepancies in the 1981 sample, due to the disappearance of 80% of Californian residents; I have discarded the remaining Californians and replaced them by a proxy, which is half of 1980 Californians and half of 1982.

The French files

The French files have a common intersection, but they are organised in a different manner. The first file is a compilation of the surveys « FQP » (*Formation-qualification-professionnelle* : 1964-1970-

⁶ It is why I have abandoned the Moffit (1993) extract of CPS 1968-1992, where occupation is coded on 2 digits.

1977) and « *Enquête Emploi* » (1983-1989-1995-2000)⁷. That file (F1), called here « *compilation FQP-Emploi* » is a prolongation of the file I have used for my Monreal paper (size of the extract containing men between age 20 and 64 is n=237.320). The second file (F2) is organised on a shorter term: a 1982-2000 cumulative file of annual *Enquêtes Emploi* (size of the extract containing men between age 20 and 64 is n=942 550).

The educational code is not a problem: the French educational system is almost stable through the twentieth century, and very structured; the codes know no change. The occupational code is more problematic. The French statistical system⁸ have created a specific code: the “*catégorie socioprofessionnelle (CSP)*” (Socio-occupational group). That code organises the social stratification system on a 6 main groups basis:

- at the top of the wage earners hierarchy: the “*cadres*” (≈EGP higher service class I, less large employers);
- at the bottom the “*employés*” (≈EGP routine white collar III) and “*ouvriers*” (≈EGP blue collar workers VI+VII);
- between these two extremities the “*professions intermédiaires*” (≈EGP lower service class II). The “*chefs d’entreprise*” and the “*agriculteurs*” are the two groups of self-employed.

The French CSP scheme is more or less structurally close to EGP scheme, even if, in the details, many choices are different. Considering that I will focus in my paper on the Service class I + II, I will not insist on the details of the differences between CSP and EGP. The two important aspects of my recodes are that: on the one hand, in the PCS scheme, since 1982⁹, the “*contremaîtres*” (≈foremen, EGP V) are in “*professions intermédiaires*” (≈Service class II); for this comparison, the “*contremaîtres*” have been declassified from that lower service class to blue collar workers. The second aspect is that I have added the “large employers (10 and +)” to the “*cadres*” for a better assimilation to EGP service class I. A better codification will follow, using previous propositions (Erikson, Goldthorpe, König, Lüttinger, Müller, 1989; Brauns, Haun, Steinmann, 1997).

Cohort and level of education

The progress of the educational level seems to be linear. If we consider, for instance, the male population between age 20 and 64, the proportion of BA degree (or more) holders (US) and of *licence*

⁷ These surveys were obtained from LASMAS-IDL-IRESO (CNRS), and extracted with the help of Irène Fournier. *Enquête Emploi* is the French labour force survey, more or less equivalent to CPS. The FQP is a shorter (the sample size does not exceed 30.000) stratified survey which describes with many refinement education and social origins. Since 1982, father’s occupation has been introduced in *Enquête Emploi*, and FQP is thus less strategic for stratification and mobility analysis.

⁸ See Desrosières et Thévenot (1988) for a quick explanation of this scheme.

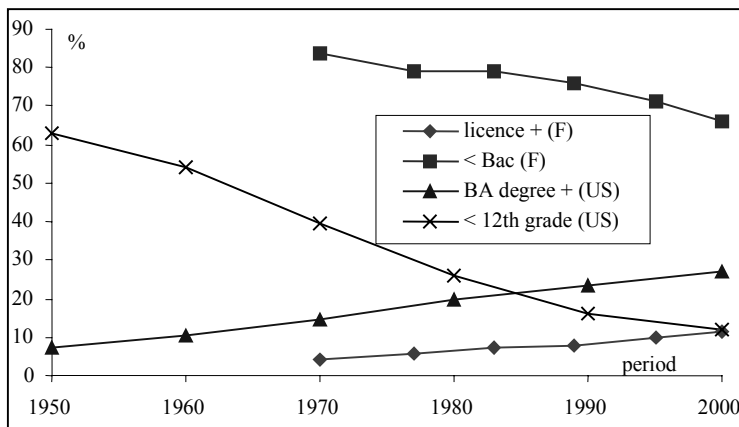
⁹ Another aspect of continuity problems appears in France when you consider the long-term file (F1). Since 1982, the French surveys had been coded according to the new nomenclature of « Professions et catégories socioprofessionnelles (PCS) ». That PCS nomenclature replaced the old « Catégories socio-professionnelles » (CSP between 1953 and 1981). The difficulty is to adapt the old CSP scheme (before 1982) and the new PCS scheme (after 1982). The solution is to joint the two digit codes considering the main statistical links (Seys, 1986), and to aggregate them in a 6 modality variable named « groupes socioprofessionnels » (GSP), and then to weight the groups before 1982 to nullify the gaps between the 2 nomenclatures.

(or more) holders (F) is growing almost linearly (diagram 3). The regularity is obvious and there is no major fluctuation. The decline of high school dropouts in United-States and the decrease in France of those who stopped school before the French *baccalauréat* (selective exam at the end of secondary education) is very constant.

We will concentrate our attention to the top of educational pyramid. If now we analyse the trend of expansion of longer tertiary education by birth cohort, the trends become clearly hacked and problematic. If we compare French and United States trends (diagram 4), we should say:

- 1- The French system of degree certification is clearly more selective, or, in other terms, underdeveloped, when it is compared to the American one.
- 2- The American system have known a long trend of accelerating progress since the 1890 cohort (slow before the 1910 cohort, and faster for the following ones), but that trend is stalling after the 1950 cohort, or even declining. The '70 cohort benefits from a new growth. Note here are the results pertaining to the United-States resident population; when the non-native population is excluded (15% or more in the population aged 30 to 35), the shapes are exactly the same.
- 3- The French system have known little growth prior to the 1935 cohort, and a boom in the probabilities of access to longer tertiary education occurred for the first cohorts of the baby-boom (a jump from 6% to 10% in the proportion of a cohort accessing to the higher stage of tertiary education). That growth corresponds to the first university boom, which resulted from massive public investment in education in the early sixties. The 1950-65 cohorts are stalling, and the following ones know a second university boom.

3- Part of male population 20-64 years old at different level of education

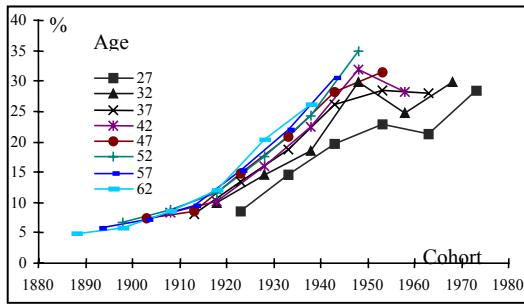


Source : US Census 1950-2000 cumulative file and F Compilation FQP-Emploi INSEE

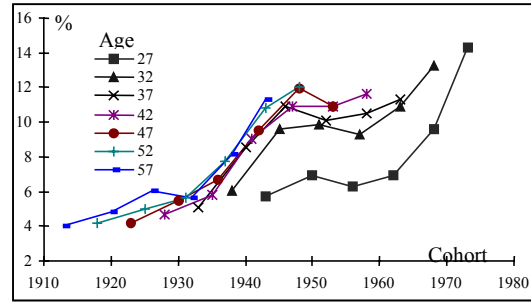
Even if the shape is not the same in France and United-States, the comparison shows that, in France and in United-States, the probabilities of enjoying longer education are clearly linked to cohort. In France, the cohort fluctuations corresponds to the national history of the educational expansion (Prost, 1996). For United-States, the period which goes from the GI's Bill (Benett, 1996) to the end of Johnson's *Great Society* have certainly been propitious to a continuing acceleration of the educational growth (Freeman, 1976). The succeeding period of stagnation or educational crunch have received little attention (an exception: Mare, 1995, p.164) and seems to have been recently discovered by social scientists (f.ex.: the economists Card and Lemieux, 1999). The analysis of long term data on

educational and college investment could explain the stalling growth by the retrenchments of public spending (Chauvel, 2001). At the end of the seventies, the re-commodification of education implied for the new cohorts of young potential students a tight choice between the resort to borrowing (in a period of credit crunch) and the shortening of education. The long wage of progress in education thus stopped.

4-US1- Bachelor’s degree holders (or more) (cohort diagram) 4-F1- Licence or more holders (cohort diagram)



Note: age “27” is the average for 25-29 age group
Source: US Census 1950-2000 cumulative file – Male pop



Note: age “27” is the average for 25-29 age group
Source: compilation FQP-Emploi. – Male pop

Is it possible to test the statistical significance of these cohort fluctuations? That is the purpose of APC models. In fact, the assessment of cohort effects could come from the comparison of simple models such as (AP) (PC) (AC) for simpler models, and with (APC-R) for the most complex.

APC model and education in United-States

The model (1) above is easy to impute to the US1 file (US Census 1950-2000 cumulative file) because of its decennial pace. The code scheme of age period cohort allows a 5 years pace for age and cohort (diagram 5).

5- Coding of c as a function of a and p for US1 file

p⇒		1	2	3	4	5	6
		1950	1960	1970	1980	1990	2000
a↓	1 30-34	6	8	10	12	14	16
	2 35-39	5	7	9	11	13	15
	3 40-44	4	6	8	10	12	14
	4 45-49	3	5	7	9	11	13
	5 50-54	2	4	6	8	10	12
	6 55-59	1	3	5	7	9	11

Note: age group a=6 at period p=1 is the cohort 1 (birth : 1891-1895); age group a=1 at period p=6 is the cohort 16 (birth : 1966-1970).

The AP model is not sufficient to explain the variations of education, when APC is very satisfying: cohort delivers an important information. When cohort and period effects are simultaneously present, the explanation of education attainment is almost perfect (under the condition to relax the constraint concerning the flatness of cohort effect). Why is the PC model so satisfying? It supposes a lack of fluctuations linked to age, but it integrates the possible fluctuations of cohort effect. If we consider a (PCI) model, where CI is not a categorical variable, but a linear one (CI is not about to represent non-

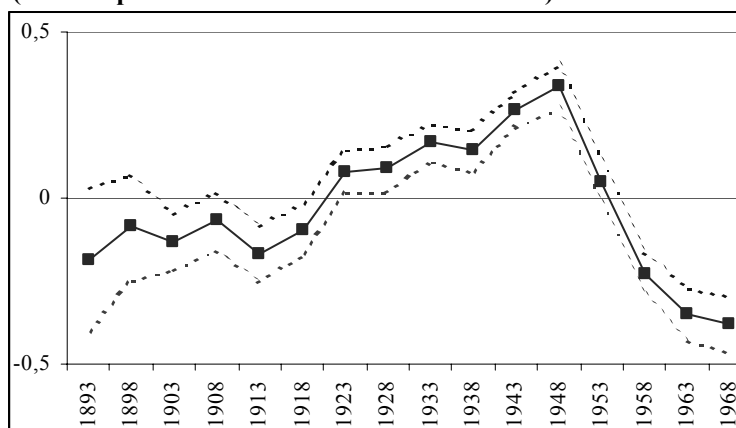
linear effects of cohort), the explanation is not satisfying. Thus, cohort fluctuations are an important aspect of educational attainment. The results of APC-R model suggest that the recovery effect could be ignored.

6-US1- proportion of Bachelor's degree holders (or more) in the male population (APC models)

#	Interactions	L ²	Df	p	Bic (1)	Δ
Sample (N = 208 194)						
1	A P	716,59	25	<,0001	410,43	4478,33
2	A C I (2)	1093,06	29	<,0001	737,92	5302,62
3	P C I (2)	770,66	29	<,0001	415,51	4581,55
2b	A C (3)	14,66	15	n.s.	-169,03	525,63
3b	P C (3)	11,87	15	n.s.	-171,82	426,43
4	A P C	6,91	11	n.s.	-127,79	363,68
5	A P C - R	6,57	10	n.s.	-115,89	326,25

Note: (1) I use the Raftery's bic (1986), which had been created for completing the significance criterion: in a large sample, any link, even the slightest, is significant, but not necessarily consequential. Raftery proposes a criterion of preferability : to what extend a model should be preferred to another ? With $bic = -2 \log B = L^2 - (df) \log N$, where N is the size of the total sample and df the number of the degrees of freedom of the model. Between two models, the least bic is preferable, when the difference exceeds 10. (2) For these two models, the cohort effect CI is supposed to be linear and not a categorical variable. (3) For these two models, the cohort effect C is a categorical variable where I relax the last constraint of model (1): I mean the constraint which assigns the c coefficients to a zero trend curve. Thus, because of colinearity, PC is "like" an APC model where the age effect is a linear trend.

7- US1- Cohort coefficients: divergence from linear trend for Bachelor's degree holders (or more) in the US male population (bootstrap evaluation of 95% confidence curve)



Source: US Census 1950-2000 cumulative file – Male pop

In fact, the most interesting result is the variation of the coefficients pertaining to cohort in the APC model. The 95% confidence intervals have been simulated *via* bootstrapping. These coefficients show the importance of educational growth for pre-baby-boom cohorts and the decline, which happens for the following ones (relatively to the linear trend). If the coefficients for cohorts seem statistically significant, are they also historico-sociologically important? I mean that with large samples, a result, which is statistically significant, could be of little importance if the involved effect affects few percents. In fact, the gap between the linear trend and the 1946-1949 birth cohort exceeds +0,33; since these coefficients are homogeneous to logistic regression coefficients, such a gap means that some cohorts can be a third above (or below) the linear trend, in relative terms. The curve suggests that the GI's Bill really benefited to cohort 1921-1925. Prior cohorts were too old to participate to WWII, or

even too old to go back to university. The ACP-R model shows a slight positive R effect (+0,14), with a standard error of 0,12, which is not significantly different from 0. In other terms, cohorts that begin with lower educational achievement do not improve their situation later comparatively to others.

8- Coding of c as a function of a and p for US2 file

	p⇒	1	2	3	4	5	6
	a↓	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999
1	30-34	6	7	8	9	10	11
2	35-39	5	6	7	8	9	10
3	40-44	4	5	6	7	8	9
4	45-49	3	4	5	6	7	8
5	50-54	2	3	4	5	6	7
6	55-59	1	2	3	4	5	6

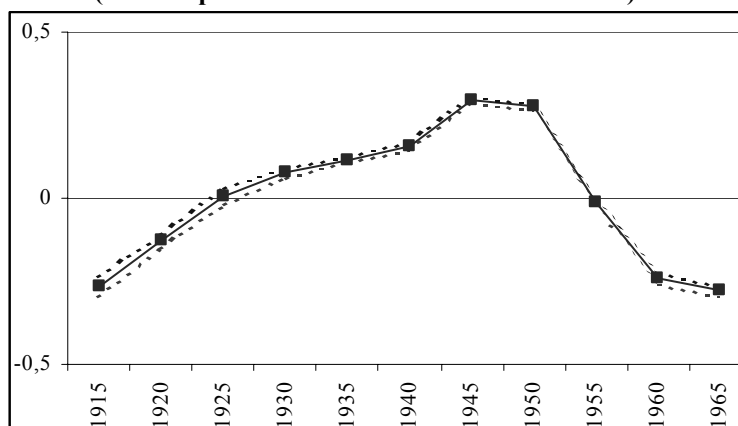
Note: age group a=6 at period p=1 is the cohort 1 (birth centred on 1915: with birth between 1911 and 1919).

9-US2- proportion of Bachelor's degree holders (or more) in the male population (APC models)

#	Interactions	L ²	Df	p	Bic (1)	Δ
Sample (N = 813 677)						
1	A P	2886,19	25	<,0001	2545,96	22097,47
2	A CI (2)	3518,69	29	<,0001	3124,02	23562,20
3	P CI (2)	3646,98	29	<,0001	3252,31	24163,30
2b	A C (3)	51,20	20	<,0001	-220,99	2456,77
3b	P C (3)	46,27	20	,001	-225,92	2394,04
4	A P C	31,64	16	,027	-186,11	1758,26
5	A P C - R	31,60	15	,004	-172,46	1780,67

Note: see table 6

10- US2- Cohort coefficients: divergence from linear trend for Bachelor's degree holders (or more) in the US male population (bootstrap evaluation of 95% confidence curve)



Source: US CPS 1968-1999 cumulative file – Male pop

We can produce the same structure of results with the US2 file (1968-1999 United States Current population survey). We code the file in a different manner, considering 5 years pace for age and for period, another code scheme is possible (see figures 8, 9, 10). Here as elsewhere, the recovery effect is almost ineffective and absolutely not significant in statistical terms.

APC model and education in France

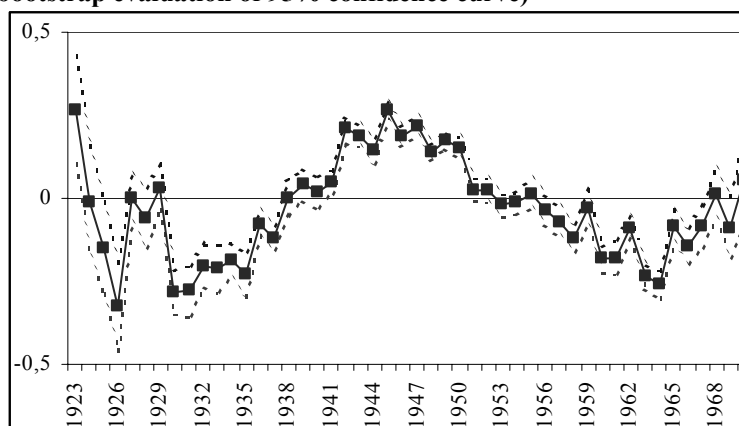
The application of model (1) to the F1 file involves other problems (the period is coded as a non-regular pace) that I will elude here. Thus, I shall apply the model to F2 file. Let's consider here a 1-year pace model, with a simple a p c code scheme: we have 30 coefficients for age, from age 30 to 59; 19 periods from 1982 to 2000; 48 cohorts from the 1923 birth cohort to the 1970 one. In that third example, the same structure of results could be discovered: important cohort fluctuations exist. The comparison between models where cohort is avoided (or where it is supposed to be a linear trend) and those where it appears as a categorical variable (and thus can reveal non-linear fluctuations) demonstrate the importance of cohort fluctuation. Considering the reduction of L^2 , the ACP-R model could be preferred to ACP, even if the bic criterion is less convincing: the catch-up effect is small: +0,102 with a standard error of 0,32. Cohorts beginning less favourably do better, but the recovery effect is small, when it is compared to the value 1, which corresponds to a perfect recovery at the end of life course.

11-F2- proportion of *licence* holders (or more) in the male population (APC models) – 1 year pace

#	Interactions	L^2	Df	p	Bic (1)	Δ
Sample (N = 627 364)						
1	A P	1398,18	522	<,0001	-5570,15	7009,11
2	A C I (2)	1405,55	539	<,0001	-5789,71	7034,59
3	P C I (2)	1840,99	550	<,0001	-5501,12	8310,49
2b	A C (3)	425,59	493	n.s.	-6155,61	3981,79
3b	P C (3)	450,74	504	n.s.	-6277,30	4092,46
4	A P C	412,71	476	n.s.	-5941,55	3940,30
5	A P C – R	403,96	475	n.s.	-5936,25	3888,14

Note: see table 6

12- F2- Cohort coefficients: divergence from linear trend for *Licence* holders (or more) in the French male population (bootstrap evaluation of 95% confidence curve)



Source: F Enquêtes Emploi INSEE 1982-2000 cumulative file – Male pop

I propose also a more flexible and light 3-years pace model, constructed with the same principles than for the US2 file: average of 3 years periods, for 3 years age groups. Ten age groups (1 to 10) pertains to 30-33 years old to 57-59; six 3-years periods goes from 1983-1985 to 1998-2000; thus, 15 cohort groups are involved. That model produces similar results with smaller confidence intervals. The R coefficient here is more important and very significant (estim: 0,41; standard error: +0,04).

Nevertheless, the recovery is not absolute ($r=1$) and, thus, the educational gaps remain important during life course.

11bis-F2- proportion of *licence* holders (or more) in the male population (APC models) – 3 years pace

#	Interactions	L ²	Df	p	Bic (1)	Δ
Sample (N = 596 223)						
1	A P	763,66	45	<,0001	165,23	5020,05
4	A P C	44,65	31	,042	-367,60	1241,25
5	A P C - R	36,16	30	,181	-362,79	1118,57

Note: see table 6

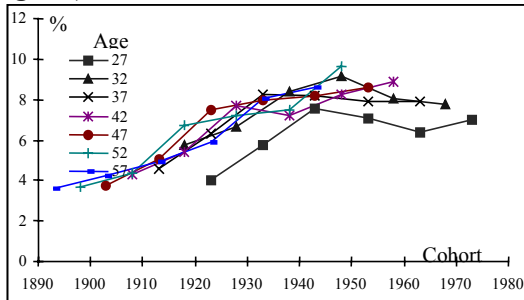
The comparison between France and United States shows that the structure and the rhythm of educational progress differ. If early baby-boom cohorts benefited from an educational boom, the American trend had been much more progressive with a gradual growth for cohorts 1920 to 1950, and a continuous decay after (relatively to the trend). Clearly, if we consider the span of our evaluation, the American waves are longer, when the French ones oscillate rapidly. The French curve is much more hacked: the '30 cohorts benefited from less educational investment than the trend, the '40 cohorts benefited from a strong expansion. A progressive pause occurs then, with a new phase of progress for cohorts born after 1965. These fluctuations, which are as important as in the American case, follow the phases of the French educational policy, which implies important inequalities between cohorts, and of which the result could be important variation in further social class attainment of the different cohorts.

Even if further education schemes exist in both countries, there is neither substantial nor significant (in United-States) “recovery effect”: these schemes of training and life long education may give the same opportunities to any cohorts, whatever the initial situation was. Thus, cohorts beginning with a weak educational attainment generally do not catch up with the others, which receives the same help.

Cohort and service class

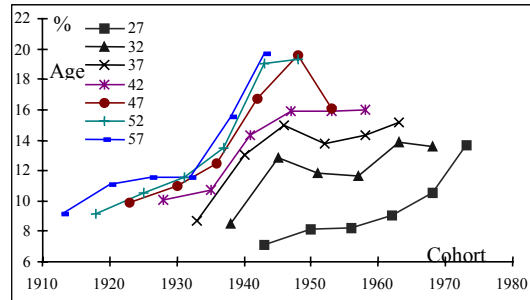
The same models could be applied to other variables, notably the probability of access to service class I or II. These models show that the same variations as above appear for the access to upper middle classes. When we analyse the cohort diagrams pertaining to service class I and I + II, the French situation clearly shows a strong cohort fluctuation (even: discontinuity) from the cohort 1935 to the 1945 one. The French history of social structure seems to be the slow progress of the '20 and '30 cohorts, then the fast expansion of middle and upper middle classes, and then a long stagnation. The younger cohorts seem to live a new trend of progress. The American history is different. Even if the fluctuations seem less important, a clear stagnation follows the progress of the '20 to '40 cohorts.

13-US1- Service class I membership (cohort diagram)



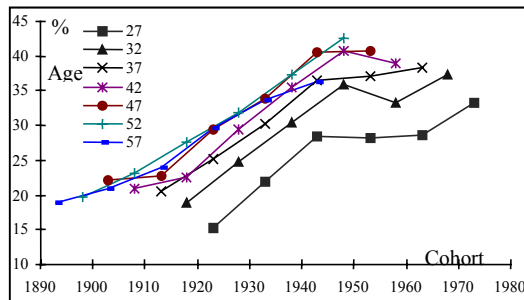
Note: age “27” is the average for 25-29 age group
Source: US Census 1950-2000 cumulative file – Male pop

13-F1- Service class I membership (cohort diagram)



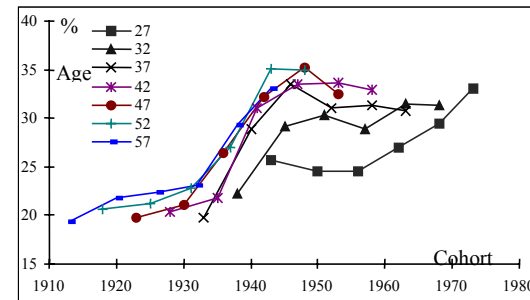
Note: age “27” is the average for 25-29 age group
Source: compilation FQP-Emploi. – Male pop

14-US1- Service class I+II membership (cohort diagram)



Note: age “27” is the average for 25-29 age group
Source: US Census 1950-2000 cumulative file – Male pop

14-F1- Service class I+II membership (cohort diagram)



Note: age “27” is the average for 25-29 age group
Source: compilation FQP-Emploi. – Male pop

In France as in United-States, the shapes of the expansion, on the one hand, of the service class I and on the other that for I + II are more or less the same. If we test the significance of cohort effects (figure 15), we find clear correspondence between cohort fluctuations in education and in class membership in terms of Service Class I + II. Nevertheless, the intensity and amplitude of cohort fluctuation seem more important for education than for class membership.

In United-States (US2 file), the ACP-R model and the ACP one are equivalent in terms of bic even ACP-R brings a significant information. The R-coefficient is +0,31 with a standard error of 0,16. For France, the R coefficient is +0,20 with a standard error of 0,07; it is significantly different from zero, but also very far from the critical value 1. Between ACP and ACP-R, the khi-2 gain is about 4 for 1 degree of freedom, which could be acceptably significant; but the *bic* grows from -383,8 to -374,5; the *r* effect is not so intense. In other words, a third in United-States, a fifth in France, of the early divergence from the linear trend can be recovered. The catch up effect is not absent but small: delays in the early career can not be perfectly caught-up.

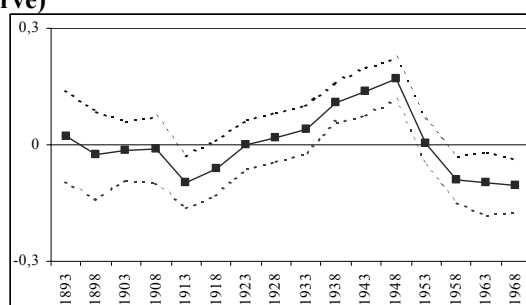
15-US2- proportion of Service class I+II in the male population (APC models) – 5 years pace

#	Interactions	L ²	Df	p	Bic (1)	Δ
Sample (N = 813 677)						
1	A P	737,68	25	<,0001	397,45	12238,39
4	A P C	42,03	16	<,0001	-175,72	2685,95
5	A P C - R	26,07	15	,023	-178,07	2036,25

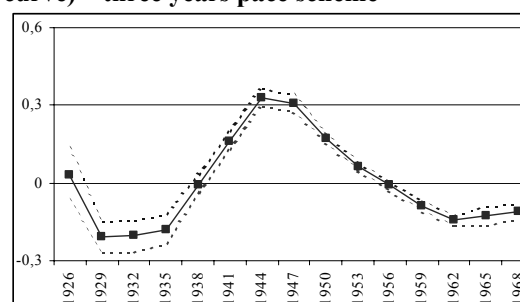
15-F2- proportion of Service class I+II in the male population (APC models) – 3 years pace

#	Interactions	L ²	Df	P	Bic (1)	Δ
Sample (N = 596 223)						
1	A P	1195,07	45	<,0001	596,64	11808,42
4	A P C	28,4	31	n.s.	-383,85	1813,18
5	A P C - R	24,4	30	n.s.	-374,55	1741,82

Note: see table 6

16-US1- Cohort coefficients: divergence from linear trend for Service Class I + II in the US male population (bootstrap evaluation of 95% confidence curve)

Source: US Census 1950-2000 cumulative file – Male pop

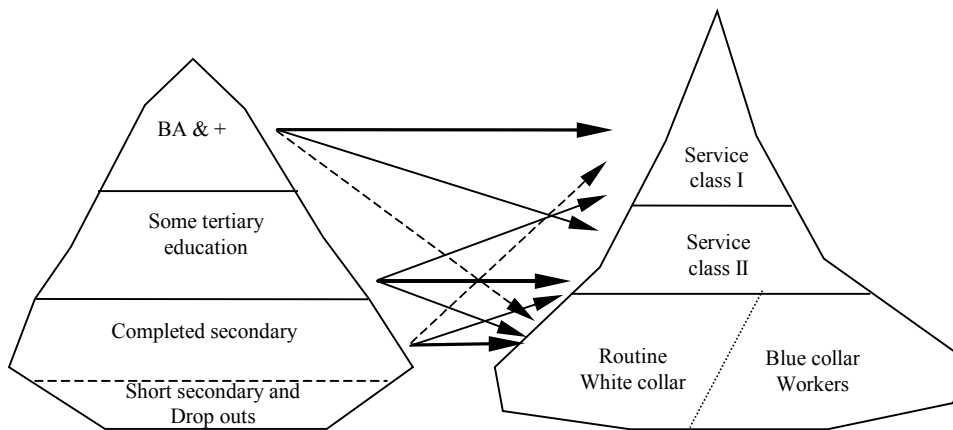
16-F2- Cohort coefficients: divergence from linear trend for Service Class I + II in the French male population (bootstrap evaluation of 95% confidence curve) – three years pace scheme

Source: Enquêtes emploi 1982-2000 cumulative file – Male pop

Cohort and correspondence between education and class service class*Two hierarchies in relation*

One of the central questions for long term dynamics of social structure system is the correspondence between two moving pyramids. Very schematically, we can represent these two hierarchies as two pyramids: the educational system produces a hierarchy of positions that will be translated in the occupational system. The problem presented here is this one: if the educational pyramid knows intense changes from a cohort to the other, does the class pyramid know the same deformations by cohort, or could we detect cohort changes in the relation between education and class membership? Such an issue could illustrate the between cohorts inequalities of education in their consequence into class positions.

17- Correspondence between two pyramids



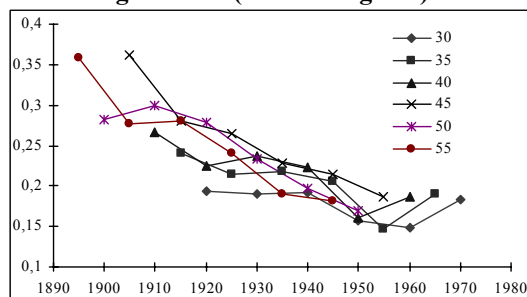
This question is clearly connected with the over-education problem: if the educational pyramid knows a large upward shift when the class pyramid remains the same, a clear *dévalorisation sociale du diplôme* (a degree devaluation) could happen. Anyway, we can imagine an opposite move, if the education system is stable when the occupational structure knows an upward shift. Other situations could be imagined.

In fact, two complementary aspects are present here: on the one hand the absolute rates of translation from education to class, I mean the probability, for a given level of education, to go into such or such class; here is the absolute social value of education. On the other hand is the relative situation of the different levels of education in the competition for the best social positions, which can be evaluated *via* odd ratios, of which depends the relative value of education. An important devaluation of education in absolute terms (when degree holders are more common and the scarcity of upper class positions remains) could go with a growing relative value of degrees. It could be the case if, for instance, the recruitment of upper classes becomes more and more selective in the direction of the top of educational pyramid. I will concentrate here my development on the absolute aspect, because cohort changes affect strategically the marginal structure of education and class. These marginal evolutions, even if their sense is more or less conventional when we compare different countries, are a much more serious aspect of social stratification when we consider the long-term changes in a given country.

An example: the certified end of long secondary education and service class I+II membership

An important aspect of these cohort changes appears when we study the destination of the population whose level of education corresponds to a certified end of secondary education (12th grade of High School in United-States, *baccalauréat* in France). That level has known an important recomposition of its position in educational pyramid during the twentieth century. Clearly, the probabilities of access to service class I and II for secondary education graduates are less important in United-States than in France, where the considered population is smaller in France, for a similar proportion of social positions. The interesting aspect is elsewhere: in trends and the evolution by cohorts of the absolute social value of that educational level.

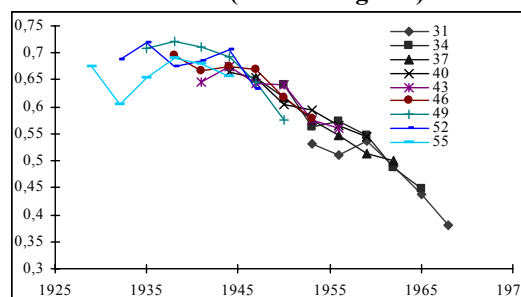
18-US1- Service class I+II membership for 12th grade of High School (cohort diagram)



Note: age “27” is the average for 25-29 age group

Source: US Census 1950-2000 cumulative file – Male pop

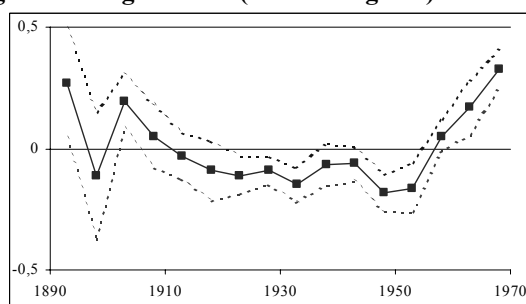
18-F2- Service class I+II membership for *baccalauréat* holders (cohort diagram)



Note: age “27” is the average for 25-29 age group

Source: Enquêtes emploi 1982-2000 cumulative file – Male pop

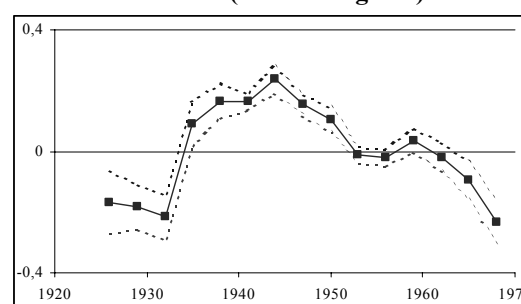
19-US1- Cohort coefficients: divergence from linear trend for Service Class I + II membership for 12th grade of High School (cohort diagram)



Note: age “27” is the average for 25-29 age group

Source: US Census 1950-2000 cumulative file – Male pop

19-F2- Cohort coefficients: divergence from linear trend for Service Class I + II membership for *baccalauréat* holders (cohort diagram)



Note: age “27” is the average for 25-29 age group

Source: Enquêtes emploi 1982-2000 cumulative file – Male pop

This level of education experiences a progressive decline of its social value in terms of probabilities of access to the service class I + II. But in the two countries, the shape is not exactly the same. In United-States, the evolution is not very important (5 points change for half a century) and more or less linear. The American dynamics seems to be characterised by a relative stability (when compared to the French example) of the relation between education and access to service class I and II. The mutations of the educational system and of the class structure have been more or less parallel, and the movement of educational devaluation almost non-existing. As we can see, the “Thernstrom effect” of social decline of the young cohorts of the thirties is not a question of devalorisation of education, but of decline of education achievement of these cohorts, decline of education which is probably linked to the scarcity of economic means during the thirties. The progress in education (for 1920 to 1950 cohorts) have had its consequences on the class structure, and the ending of middle and upper middle class expansion (for post-1950 cohorts) was perfectly in phase with the educational break.

In France, the cohorts born before 1950 have known almost no devaluation of the *baccalauréat*. The fall of its value really comes after the 1950 cohort, with about 10% of decay between the 1955 cohort and the 1965 one. In other terms, the first cohorts who have experienced the first educational boom have not been submitted to the decline of the value of *baccalauréat*: the following ones, coming in the context of an educational stagnation, experienced that devaluation. The r coefficient is not statistically different from 0. In other terms, after the entry of a cohort in the class structure, there is no substantial modification of its position relatively to other cohorts during life course. In the French example, we have a very strange case: the *baccalauréat* of the 1945 cohort, which was twofold more frequent than for the 1935 cohort was not devaluated, when the *baccalauréat* of the 1955 cohort, as scarce as for

those born ten years before, is devaluated. In other terms, the labour markets and the social process of status attainment seems to be clearly segmented by cohorts. When we develop a given level of education, elder cohorts, which have obtained this level of education when it was scarce and which have yet their position in the class structure, do not suffer from the diffusion and the social devaluation of this level of education.

Discussion : cohort and social change rhythm

Evidently, this paper suffers from some limitations: I still have to evaluate systematically the links between education and class. I have also insisted here in the evolution of absolute value of education. In terms of relative value, important facts have been eluded here (this paper would have been longer, and very late), notably with an ACP-based multinomial logit model of assessment of the relative link between education and class.

I would better insist on the main results of this paper. The global trends of the social structure changes — expansion of education, growth of middle and higher strata, social value of diploma — as many other aspects¹⁰, could hide important fluctuations by cohort. This paper shows some important aspects of inequalities between cohorts, in terms of probabilities to enjoy longer education, to get into the higher social classes, to see one's educational level correctly valued in the occupational structure. Clearly, the dynamics of education is here in a central situation, and the shifts from the linear trend appear to have important effects on the social stratification system.

In fact, if these evolutions by cohorts were linear, there would be almost no inequality: that linearity allows prediction and each cohort could evaluate in advance its destiny. This paper shows that the cohort fluctuations (the divergence from the linear trend) are mostly substantial and durable; that means non-linear evolution of the social structure system (education and class) can appear. This means also a fundamental uncertainty for any social actor, public as private, students as employers: stop and go policies in education, for instance, produce difficulties to analyse the possibilities offered to different cohorts and the social value affected to the different levels of education. Few years of distance could mean very diverging possibilities.

Consequently, when a trend of change in social structure is analysed (education, Service class I+II expansion, etc.), its cohort dissection might be useful to evaluate the degree of participation of each cohort to that trend. The cohort decomposition might underline specific phenomena, fluctuations, accelerations and slowdowns which can define the specificity of cohorts; here, from the 1950 to 1965 cohorts, fifteen birth years, a social generation had experienced no substantial amelioration of its social destiny in terms of class, and problematic evolutions of education level. These results show that the downward swing of the so-called "X-generation" is not simply a journalistic hallucination, but also a measurable empirical problem of investment in human capital.

Therefore, cohort might be considered as an essential time for social change analyses (Ryder, 1965). In social generation research, the danger of super-interpretation is certainly important (Becker, 2000), but to forget cohort specificity could be a profound deficiency in social research. If the chances to have access to the various social positions are fixed at 30 years old, if the collective life cycle of the

cohorts continues to be stable, having the same shape and slope, the cohort would appear as the *true* social time of the changes in social stratification. The most important aspect is that, if cohorts keep the long-term scars of its early socialisation, cohort analysis is a very important aspect for the understanding of social history.

Bibliography :

- Baudelot C. et M. Gollac, 1997, « Le salaire du trentenaire : question d'âge ou de génération ? », *Economie et statistique*, 304-305, pp. 17-35.
- Becker H., 2000, « Discontinuous change and generational contracts », pp. 114-132, dans S. Arber and C. Attias-Donfut, *The Myth of Generational Conflict*, London, Routledge.
- Blau P.M. et O.D. Duncan, 1967, *The American Occupational Structure*, New York, Wiley.
- Brauns, H., D. Haun and S. Steinmann, 1997, « Die Konstruktion eines international vergleichbaren Klassenschemas (EGP). Erwerbsstatistische Besonderheiten am Beispiel von Labour Force Surveys der Bundesrepublik Deutschland, Frankreichs, Großbritanniens und Ungarns. », Mannheimer Zentrum für Europäische Sozialforschung, Universität Mannheim (MZES), Arbeitspapiere Arbeitsbereich I, 22, 1997
- Card D. et T. Lemieux, 2000 : « Can falling supply explain the rising return to college for younger men? : a cohort-based analysis », *NBER working paper series*, n°7655.
- Chambaz C., E. Maurin, J.M. Hourriez, 1996, « Revenu et niveau de vie d'une génération à l'autre », *Revue économique*, 47, pp. 677-686.
- Chauvel L., 1997a, « L'uniformisation du taux de suicide masculin selon l'âge : effet de génération ou recomposition du cycle de vie ? », *Revue française de sociologie*, XXXVIII-4, pp.681-734.
- Chauvel L., 1998a, « La seconde explosion scolaire : diffusion des diplômes, structure sociale et valeur des titres », *Revue de l'OFCE*, 66, pp. 5-36.
- Chauvel L., 1998b, "Cohort changes in Education, Social Stratification and Mobility, the Case of France (1964-1995)", paper presented at the 1998 Montreal meeting of Research Committee 28 Social Stratification and Mobility, July 1998, Montreal, Quebec.
- Chauvel L., 1998c, *Le destin des générations, structure sociale et cohortes en France au XXe siècle*, Presses Universitaires de France, Paris.
- Chauvel L., 2001, « Un nouvel âge de la société américaine ? Dynamiques et perspectives de la structure sociale aux Etats-Unis (1950-2000) », *Revue de l'OFCE*, n°76, pp.7-51.
- Desrosières A. et L. Thévenot, 1988, *Les catégories socioprofessionnelles*, Paris, La découverte.
- Erikson R., J.H. Goldthorpe et L. Portocarero, 1979, « Intergenerational Class Mobility in Three Western European Societies : England, France, and Sweden », *British Journal of Sociology*, 30, pp. 415-430.
- Erikson R., J.H. Goldthorpe, W. König, P. Lüttinger, W. Müller, 1989, *The International Mobility Superfile (IMS) Documentation*, Casmin Projekt, Universität Mannheim, *Mimeo*.
- Freeman R.B., 1976, *The overeducated american*, New York, Academic Press.
- Ganzeboom H.B.G. and P. Nieuwebeerta, 1996, *International Social Mobility and Politics File (P1145)*, Amsterdam, Steinmetz Archive - SWIDOC
- Glass D. and J.R. Hall, 1954, « Social Mobility in Britain : a Study of Inter-Generation Changes in Status », pp. 177-217, dans D. Glass (ed.), *Social Mobility in Britain*, London, Routledge and Kegan Paul.
- Jaffe A.J. and R.O. Carleton, 1954, *Occupational Mobility in the United States 1930-1960*, King's Crown Press, University of Columbia, New York.
- Legris B. et S. Lollivier, 1996, « Le niveau de vie par génération », *INSEE-Première*, 423.
- Mare R., 1995, « Changes in educational attainment and school enrolment », pp. 155-213, in R. Farley (dir.), *State of the Union : America in the 1990s*, New York, Russell Sage Foundation.
- Mason K.O., W.M. Mason, H.H. Winsborough et W.H. Poole, 1973, « Some Methodological Issues in Cohort Analysis of Archival Data », *American Sociological Review*, 38, pp. 242-258.

¹⁰ The growth of wages (Baudelot et Gollac, 1997), of income (Legris et Lollivier, 1996 ; Chambaz, Maurin, Hourriez, 1996), of suicide rates (Chauvel, 1997), of dwelling property (Chauvel, 1998c), for the intensity of the link between social origin to education (Vallet et Thélot, 1999) etc.

Moffitt R., 1993, *Current Population Surveys : March Individual Extracts, 1968-1992*, (Computer file) ; ICPSR version. Madison, WI: University of Wisconsin, Institute for Research on Poverty (Producer). Ann Arbor, MI: Inter-university Consortium for Political and Social Research (distributor). Données obtenues auprès de la Banque de Données Socio-Politiques du CNRS (CIDSP/BDSP, CNRS-IEP de Grenoble)

Prost A., 1998, « L'Education nationale depuis la Libération », *Les Cahiers français*, dossier : Le système éducatif, n°285, pp. 1-12.

Raftery A.E., 1986, « Choosing Models for Cross-Classifications », *American Sociological Review*, 51, pp. 145-146.

Ruggles S., M. Sobek et. al., 1997, *Integrated Public Use Microdata Series: Version 2.0*, Minneapolis: Historical Census Projects, University of Minnesota.

Ryder N.B., 1965, « The Cohort as a Concept in the Study of Social Change », *American Sociological Review*, 30, pp. 843-861.

Seys B., 1986, « De l'ancien code à la nouvelle nomenclature des CSP. Etude méthodologique », *Archives et documents de l'INSEE*, 156.

Thernstrom S., 1973, *The Other Bostonians: Poverty and Progress in the American Metropolis, 1880-1970*, Harvard University Press, Cambridge (Mass.).

Thélot C. et L.A. Vallet, 2000, « La réduction des inégalités sociales devant l'école depuis le début du siècle », *Economie et statistique*, n°334, p.3-32.

Wilmoth J.R., forthcoming, "Age-Period-Cohort Models in Demography", in G. Caselli, J. Vallin, and G. Wunsch (eds.), *Démographie: Analyse et Synthèse* (<http://demog.berkeley.edu/~jrw/Papers/apc.pdf>)